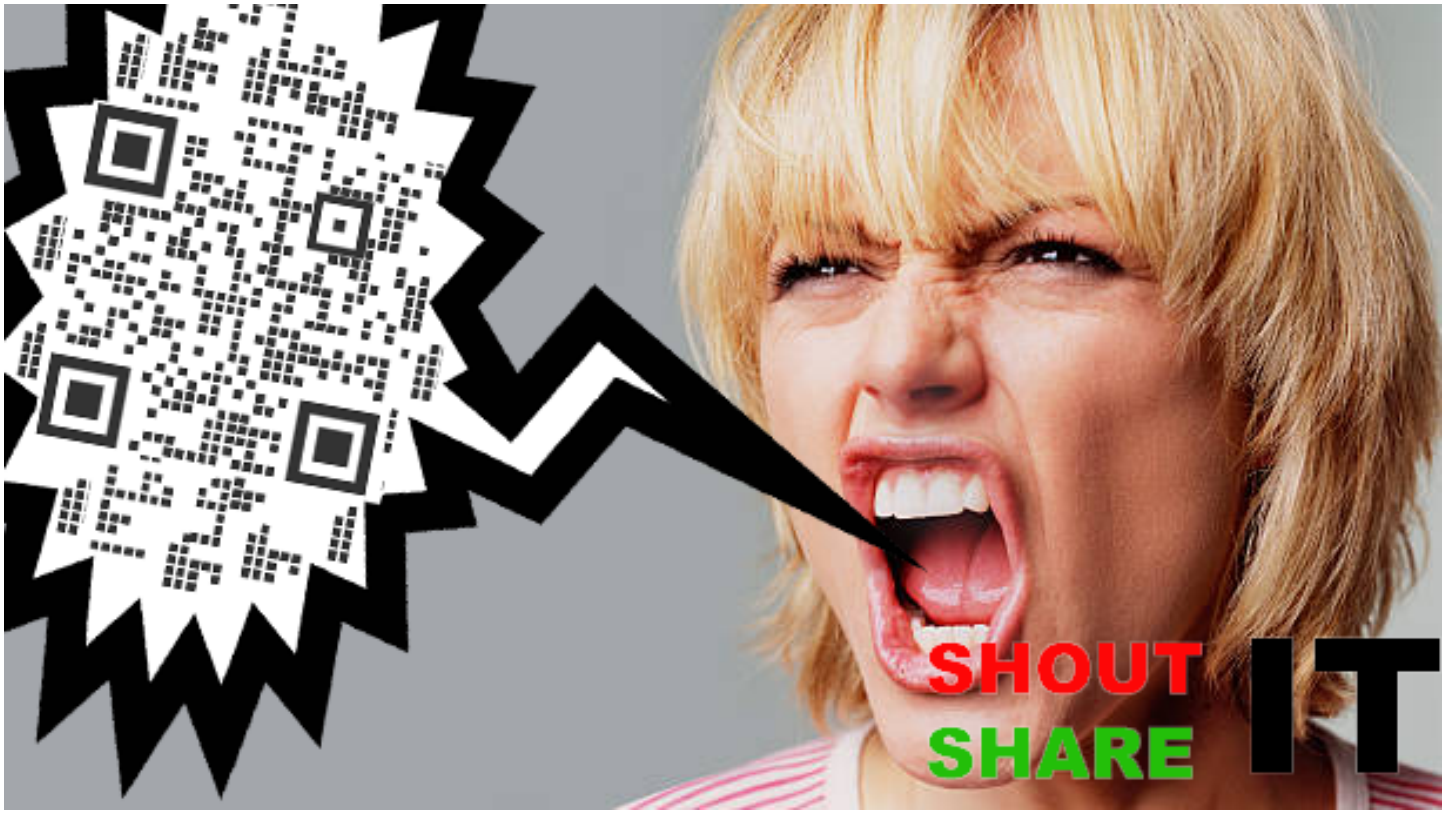
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Bulletin of the British Museum (Natural History)

Entomology series Vol 47 1983

British Museum (Natural History)
London 1983

Dates of publication of the parts

No 1 . . . . . 29 September 1983

No 2 . . . . . 24 November 1983

No 3 . . . . . 29 December 1983

ISSN 0524–6431

Printed in Great Britain by Henry Ling Ltd, at the Dorset Press, Dorchester, Dorset

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A new genus of oriental lacewings (Neuroptera: Chrysopidae)

S. J. Brooks

Entomology series
Vol 47 No 1

29 September 1983

The *Bulletin of the British Museum* (*Natural History*), instituted in 1949, is issued in four scientific series, Botany, Entomology, Geology (incorporating Mineralogy) and Zoology, and an Historical series.

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World List abbreviation: *Bull. Br. Mus. nat. Hist.* (Ent.)

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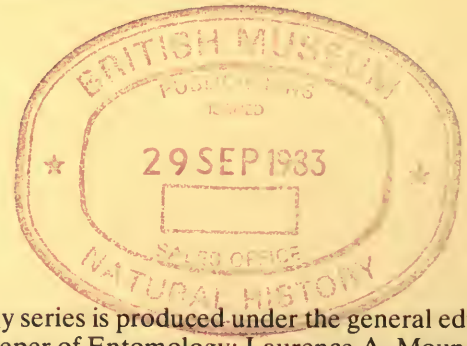

The Entomology series is produced under the general editorship of the
Keeper of Entomology: Laurence A. Mound
Assistant Editor: W. Gerald Tremewan

ISSN 0524–6431

British Museum (Natural History)
Cromwell Road
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Entomology series
Vol 47 No 1 pp 1–26

Issued 29 September 1983

A new genus of oriental lacewings (Neuroptera: Chrysopidae)

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S. J. Brooks

Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD

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Synopsis

Semachrysa, a new genus of green lacewings, is described. Fourteen species are recognized, of which seven are described as new, distributed throughout the Oriental region, Japan, N. Australia and New Hebrides. One new synonym is established and two lectotypes are designated. The tribe Ankylopterygini is redefined and its classification is discussed. *Nothancyla* Navás is removed from the tribe and provisionally placed in the Chrysopini. *Sencera* Navás is transferred to the Ankylopterygini. Keys are given to the world genera of the Ankylopterygini and to the species of *Semachrysa*.

Introduction

The green lacewings (Chrysopidae) are a cosmopolitan family of Neuroptera with over 1500 species currently recognized. They are of particular interest to applied entomologists because the predaceous larvae of some species have been used successfully in the biological control of certain homopterous pests (New, 1975). However, identification of green lacewings is often very difficult because many species are superficially very similar. Furthermore, descriptions of species by earlier authors were often inadequate, being based on unreliable external characters. For correct species determination it is éssential to examine the genitalia. However, this is a relatively new technique in the study of this group and so it is necessary to re-examine and redescribe much of the older material. Often only the male genitalia will show sufficient characters for specific determination, and many females can be identified only to generic level unless they show useful external characters.

The problem of identification has been compounded by the uncertainty of the higher classification of the family. Tribes and genera have often been described on the basis of wing venation characteristics which can vary even intraspecifically. Furthermore, many of the recently described genera are based solely on the presence of certain components of the male

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genitalia, but these may be reduced or lost in some species (Adams, 1975). Although these genera may form monophyletic groups, the inability to place unassociated females even into their correct genus is unsatisfactory.

The Chrysopidae has been divided into three subfamilies. The Nothochrysinae (Navás, 1910) and the Apochrysinae (Handlirsch, 1908), both of which have well-defined characteristics, have been revised by Adams (1967) and Kimmins (1952*b*) respectively. The remaining genera constitute the Chrysopinae (Esben-Petersen, 1918), but this group has not yet been clearly defined, and may not be monophyletic. Hölzel (1970) recognized three tribes within the Chrysopinae: the Chrysopini, Italochrysini and Ankylopterygini, and Adams (1978) also lists the Leucochrysini and Belonopterygini but none of these tribes has been adequately defined. The tribe Ankylopterygini, of which *Semachrysa* is a member, was first proposed by Navás (1910) to include *Ankylopteryx* and *Nothancyla*, but the group has never been revised.

The aim of this paper is to redefine the Ankylopterygini and demonstrate that it is monophyletic, to discuss the relationships of the constituent genera, and to assign species to the new genus *Semachrysa*.

Abbreviations

BMNH British Museum (Natural History), London, U.K.
EIHU Entomological Institute, Hokkaido University, Sapporo, Japan.
IP Institut für Pflanzenschutzforschung, Eberswalde, D.D.R.
MCZ Museum for Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A.
RNH Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.
ZI Zoologiske Institut, Lund, Sweden.

Acknowledgements

I am very grateful to the following for the loan of specimens: Ms M. Hathaway, MCZ; Dr P. H. van Doesburg, RNH; The Director, IP; Professor P. Brinck, ZI; Mr W. R. B. Hynd, Farnham, Surrey, U.K. Thanks are also due to Mr S. Tsukaguchi, Osaka, Japan for information regarding *S. matsumurae* (Okamoto).

Methods

All drawings in this paper were made using a camera lucida attachment on a stereo-microscope. Male and female genitalia preparations were made in glycerine to avoid any distortion due to flattening. Terminology for genitalia and wing venation follows that of Tjeder (1966).

Measurements to express the ratio of the distance between *Sc* and *R*, and *R* and the posterior margin of the fore wing (p. 4), were made with a calibrated eye-piece graticule. Wing measurements given are taken from the apex to the base of the wing.

Tribe **ANKYLOPTERYGINI** Navás

Ancilopteriginos Navás, 1910: 59. Type-genus: *Ankylopteryx* Brauer.
Ancylopterygini Navás, 1913: 293.
Ankylopterygini Hölzel, 1970: 51.

Small to medium species, fore wing 7–17 mm, green or sometimes brown. Head short with eyes large and gena short. Temporal and postfrontal sutures distinct, producing raised central part of vertex. Antenna usually as long as or longer than fore wing. Scape slightly longer than broad, about three times length and three times breadth of pedicel; flagellar segments narrower than pedicel, about three times as long as broad. Setae on basal flagellar segments arranged in three concentric rings, on distal segments in four concentric rings. Mandibles long, slender, curved and symmetrical, lacking internal tooth (Fig. 7). Apical segments of labial and maxillary palps taper to slender, elongate apexes (Fig. 6). Galea with truncate apex and small apical papilla near outer angle; ligula rounded at tip; submentum slightly longer than broad (Fig. 5). Pronotum short. Legs short. Claws with or without basal dilation. Fore wing broad with broad basal costal area; hind wing narrow with narrow costal area. *Sc* and *R* close in all wings, diverging below

pterostigma. Fore wing with basal subcostal crossvein present. Cell *im* ovate or subtriangular. In fore wing cell m_2 longer than cell m_1; cell m_1 longer than cell *im*. Fore wing with *Rs* usually sinuate. Fore and hind wing with two series of gradate crossveins; *Psm* merges with outer gradate series. Setae on costal margin of fore wing generally long. Frenulum present at base of hind wing. ♂ with sternites 8+9 fused. Gonarcus arcuate. Arcessus or pseudopenis present. Entoprocessus present, either free or fused apically. Gonosaccus very long, simple or paired, with gonosetae. Hypandrium internum and comes present. Tignum and gonapsis lacking. ♀ with no praegenitale at tip of seventh sternite. Subgenital plate bilobed, at tip of membranous structure. Spermatheca rounded and flattened; duct simple or twisted; vela variable in size; ventral impression present or absent.

REMARKS. About 70 species of Ankylopterygini have been described, and there are several undescribed species in the BMNH. The biology is poorly known but the larvae are probably predaceous, like those of other Chrysopidae, feeding either on soft-bodied phytophagous insects such as Aphidae and Coccidae or on coccinellid larvae. The ecology is also little known but an association of many southern African species with 'dense, damp vegetation' has been recorded (Tjeder, 1966). Tjeder also observed that the wings are folded flat over the body when the insect is at rest, unlike the rest of the Chrysopidae in which the wings are folded downwards, roof-like. He concluded that the flat-folded wing behaviour of the Ankylopterygini is probably the result of the broad basal costal area of the fore wings which, if folded downwards, would prevent the short fore and middle legs from reaching the substrate.

Tjeder (1966) figures the ligula of *Ankylopteryx venusta* (Hagen) as emarginate, but this appears to be exceptional because this structure is rounded in all species examined.

Geographical distribution

The tribe is confined to the Old World and shows an almost continuous distribution from Africa (south of the Sahara), through Madagascar, Seychelles and Maldives, Sri Lanka, southern and eastern India, southern China, Japan, Philippines, Malaysia and Indonesia to northern Australia and the New Hebrides. It is restricted almost entirely to the tropics.

Classification of Ankylopterygini

Navás (1910; 1913; 1914) divided the Chrysopidae into several tribes which were based on relatively trivial venational characters and which have generally been ignored by subsequent authors in revisional studies of the family, e.g. Tjeder (1966), Aspöck *et al.* (1980) and New (1980).

The tribe Ankylopterygini (Navás, 1910) was characterized by the large basal costal area in the fore wing and a narrow hind wing, and included the genera *Ankylopteryx* and *Nothancyla*. Although the broad basal costal area of the fore wing is a distinctive feature of the tribe it may also be a ground-plan neuropterous character because it occurs in other unrelated groups within the Chrysopidae, such as the Apochrysinae (as well as in other families such as the Hemerobiidae, Psychopsidae and Rapismatidae), and so cannot be relied upon when defining the tribe.

Hölzel (1970) elaborated upon Navás's description and noted that the tribe also possessed symmetrical mandibles, simple male genitalia with a gonarcus and pseudopenis or arcessus, and that sternites 8+9 were fused in the male. Hölzel's description, however, is still not adequate for defining the tribe because these characters occur widely throughout the Chrysopidae. A number of adult characters are discussed below which show the Ankylopterygini to be a monophyletic group, and a comparative study has also been made with representatives of the other neuropterous families. It can now be shown that *Nothancyla* is unrelated to the Ankylopterygini, but that *Semachrysa* and *Sencera* should be included in the tribe. Because the other tribes of the Chrysopinae have not yet been clearly defined it has not been possible to show their relationships with the Ankylopterygini.

In species of Ankylopterygini the mandibles are long, slender, evenly curved and lack internal teeth. In the rest of the Chrysopidae and the remaining families the mandibles are short and broad, often with an internal tooth on one or both mandibles. Hölzel (1970) mentioned that the mandibles were symmetrical in the Ankylopterygini, but there are several other genera in the Chrysopinae which are not related to the Ankylopterygini, such as *Tumeochrysa* Needham and

Nineta Navás, in which the mandibles are symmetrical. In these two genera the mandibles are short and broad.

Another distinctive character of the Ankylopterygini is the elongation of the apical segments of the labial and maxillary palps. Although not found elsewhere in the Chrysopidae a similar condition occurs in some genera of the Hemerobiidae and Berothidae where it is presumed to have arisen independently. The basic neuropterous pattern is for the apical segment of the palps to be short and truncate.

Tjeder (1966) commented that the close proximity of veins *Sc* and *R* in both fore and hind wings is a feature of *Ankylopteryx*. It can now be shown that it is characteristic of the tribe. The relative distance between these veins is quantified as the ratio of the distance between *Sc* and *R* to the distance between *Sc* and the hind margin at the mid-point of the fore wing. In this way comparisons can be made between wings that are narrow and those that are broad. In the Ankylopterygini, and in some genera of the Apochrysinae, this ratio does not exceed 0·018:1, but in the rest of the Chrysopinae, the Nothochrysinae and the other neuropterous families it is usually more than 0·020:1.

The narrow hind wing is also a characteristic of the tribe, the ratio of hind wing length to breadth always being greater than 3·3:1. In other genera of the Chrysopidae, except some species of *Chrysoperla* Steinmann, the ratio is smaller. The Nemopteridae is also characterized by narrow hind wings but in this family they are highly modified, and broad hind wings appear to be the basic neuropterous pattern.

The male genitalic characters mentioned by Hölzel (1970) occur quite widely throughout the Chrysopidae; although the fusion of sternites 8+9 is probably a derived character, it too is commonly encountered in the family so that these characters cannot be used to define the tribe. However, the long gonosaccus in the male genitalia is characteristic of the tribe: in the rest of the Chrysopidae this structure is short.

The above characters define the Ankylopterygini and show that the tribe is a discrete monophyletic group within the Chrysopidae. Until the other tribes proposed by Navás are investigated in this way it will not be possible to say if they too form useful taxonomic groups.

Navás (1910) included *Nothancyla* in the Ankylopterygini because of the very broad costal field at the base of the fore wing and because the hind wing appeared to be narrow in comparison with the fore wing. Measurement of the hind wing, however, reveals that in fact it is quite broad, with a length to breadth ratio of 2·7:1, which is well outside the minimum of 3·3:1 for the Ankylopterygini. As noted previously the broad costal field of the fore wing is not a sufficiently reliable character to justify placing *Nothancyla* in the Ankylopterygini, and it does not possess any of the other characters used above to define the tribe. The apexes of the labial and maxillary palps are truncate, the mandibles are short and broad, and *Sc* and *R* are widely separated (0·037:1). In the male genitalia the gonosaccus is short and the entoprocessus absent. There is also a tignum (New, 1980) which is completely lacking in the rest of the Ankylopterygini, although it is found in certain other genera of the Chrysopinae. The wing venation appears to be less specialized than in other genera of the Ankylopterygini because there are several branched costal crossveins and the venation is generally more reticulated. However, the absence of a basal crossvein between *Sc* and *R* is unique among the Chrysopinae, though the same condition is found in the Apochrysinae. The flagellar segments are also much broader than those of the Ankylopterygini. It is clear, therefore, that *Nothancyla* should be removed from the Ankylopterygini but until the other tribes of the Chrysopinae have been more clearly defined the affinities of this genus will remain uncertain. On the basis of the arcuate gonarcus and the presence of a tignum I provisionally assign it to the Chrysopini. There are several other genera which Hölzel (1970) listed in the Chrysopini which share these two characters.

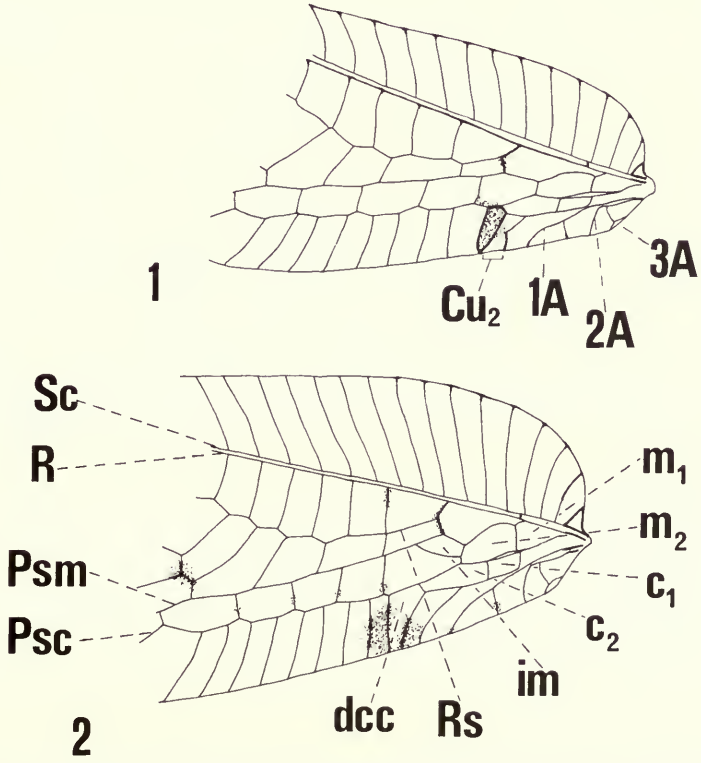
The status of the other genera in the tribe also needs reconsideration. At present *Parankylopteryx* is a subgenus of *Ankylopteryx* (Tjeder, 1966) and *Sencera* is a distinct genus. *Sencera*, however, is distinguishable from *Ankylopteryx* solely on the absence of the intramedian cell but this condition is approached in several of the Oriental species of *Ankylopteryx*, such as *A. doleschali* Brauer and *A. obliqua* Banks, and also in *A. decorsei* Navás from Africa, where cell *im* is much reduced in size. The generalized pattern of the male and female genitalia of *Sencera* is

also similar to that of *Ankylopteryx*. In contrast, the male genitalia of *Parankylopteryx* are very different from those of *Sencera* and *Ankylopteryx*. The entoprocessus are short in *Parankylopteryx* but long in *Ankylopteryx* and *Sencera*, and the arcessus is fused to the gonarcus in *Parankylopteryx*, but a separate pseudopenis is present in *Ankylopteryx* and *Sencera*. *Parankylopteryx* also possesses a paired gonosaccus, whereas this is simple in *Ankylopteryx* and *Sencera*. It seems likely, therefore, that *Sencera* is most closely related to *Ankylopteryx* and should have, at most, subgeneric status, and that *Parankylopteryx* is probably more distantly related and should be considered a genus.

These three genera appear to form a closely related group but *Semachrysa* seems to be more isolated and possesses four characters not found in the other genera of the tribe. The margin of the labrum is straight and not indented as in other genera of the Chrysopidae. The row of black spots on the frons and the spot on the postocular lobe, which occur in all species of *Semachrysa*, are not encountered in any other species in the Ankylopterygini and rarely occur in these positions in other chrysopid species. The possession of two pairs of long, lateral gonosetae (one pair in *S. cruciata*) also seems to be a specialized character of *Semachrysa* because the generalized chrysopid condition is for the gonosetae to be short and numerous. Another character which sets *Semachrysa* apart from the other genera in the tribe is the possession of three to four crossveins between *Sc* and *R* below a long pterostigma. In the other genera of the group the pterostigma is short and there are only one or two apical crossveins between *Sc* and *R*.

Key to the genera of Ankylopterygini

1 Margin of labrum straight. Three to four crossveins between *Sc* and *R* below pterostigma in fore wing. Head with dark spot on frons below each antenna (Figs 3, 4). Male gonosaccus with four (rarely two) long lateral gonosetae ..... ***SEMACHRYSA*** gen. n. (p. 6)



Figs 1, 2 1, *Sencera exquisita* Nakahara, base of fore wing. 2, *Ankylopteryx nonelli* Navás, base of fore wing. c_1 = cubital $cell_1$; c_2 = cubital $cell_2$; dcc = distal cubital cell; im = intramedian cell; m_1 = median $cell_1$; m_2 = median $cell_2$.

– Margin of labrum indented. One or two crossveins between *Sc* and *R* below pterostigma in fore wing. No spots on frons. Male gonosaccus with numerous short gonosetae 2

2 (1) Cell *im* absent in fore wing (Fig. 1) ..... ***SENCERA*** Navás
– Cell *im* present in fore wing (Fig. 2) 3

3 (2) Base of fore wing costa green. Tarsi dark brown. Male with entoprocessus long, usually fused apically; gonosaccus simple; pseudopenis present, arcessus absent.....
ANKYLOPTERYX Brauer
– Base of fore wing costa black. Tarsi green. Male with entoprocessus short, not fused apically; gonosaccus paired; pseudopenis absent, arcessus present .....
PARANKYLOPTERYX Tjeder

SEMACHRYSA gen. n.

Indochrysa Banks, 1938: 225. [Unavailable name: no type-species designated.]

Type-species: *Semachrysa minuta* sp. n.

Small lacewings; fore wing 7–13 mm. Head as in Figs 3, 4. Labrum small, margin straight, brown or black dorsally. Scape broad, three times length of pedicel; pedicel about same length as flagellar segments. Antenna green, same length as or longer than fore wing. Genae marked with dark brown; marking often continuous along lateral edge of clypeus and onto frons but always interrupted centrally. Single black spot present on frons below base of each antenna with black spot between in most species. Postocular lobe with black spot. Fifth segment of maxillary palp usually with brown band (Fig. 6). Ligula rounded at tip (Fig. 5). Pronotum unmarked, broader than long, not tapering anteriorly. Mesonotum usually marked with brown to varying degree. Legs short, unmarked. Claws with slight basal dilation (Fig. 10) or simple (Fig. 27). Base of fore wing and basal quarter of costa black; basal costal area slightly expanded. *Sc* and *R* close in all wings, diverging at pterostigma with three to four crossveins between. Cell *im* in fore wing ovate. *Rs* sinuate. Frenulum present in hind wing but not prominent. Setae on costal margin of fore wing quite short and inclined towards wing apex. Abdomen green, usually unmarked. ♂ genitalia with arcessus present, bifurcating basally and tapering apically. Gonosaccus simple, long, usually with two pairs of long lateral gonosetae and a short pair anterior to arcessus, projecting anteriorly. ♀ genitalia with spermatheca rounded; duct simple or twisted; vela distinct, often long; ventral impression present.

Remarks. Banks (1938) erected *Indochrysa* as a subgenus of *Chrysopa* Leach to accommodate *Chrysopa nigribasis* and *C. cruciata* which have 'broad basal costal spaces [in the fore wings], three dark spots in a transverse row below the antennae and ornate wings'. Banks (1937) had previously noted the affinities of *Chrysopa nigribasis* with *Ankylopteryx claggi* but did not formally group these species together. This relationship between *Ankylopteryx* and *Semachrysa* (as *Indochrysa*) is also suggested in his key to Malaysian Chrysopidae (Banks, 1938) where these two taxa separate at the same couplet. Kimmins (1952*a*) recognized a relationship between *Ankylopteryx picilabris* and 'the *claggi-nigribasis* group of species' but he too made no formal attempt to group them. More recently New (1980) noted that *picilabris* is 'distinct from other Australian taxa' [of *Ankylopteryx*] but did not comment further.

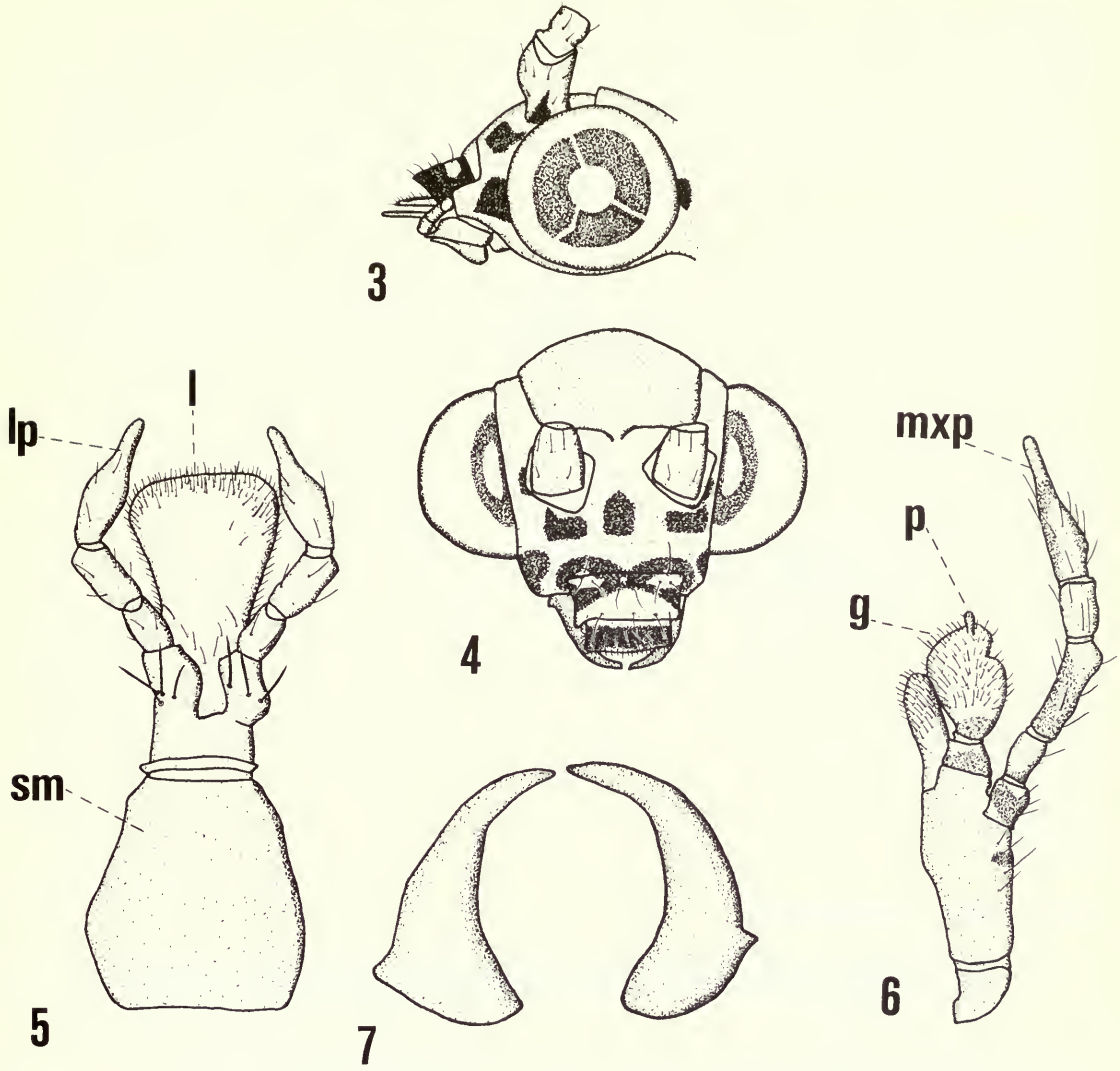
These species have been brought together in *Semachrysa* and their affinities with *Ankylopteryx* have been confirmed.

The species-groups of *Semachrysa*

The species of *Semachrysa* can be divided into three groups based on the male genitalia, particularly in the shape of the arcessus. No group characters have been found in the female genitalia, which show the generalized Chrysopinae pattern; of the five species known only from females four are omitted from the following list.

Group 1: *S. minuta, hyndi, papuensis, contorta, decorata.*
Group 2: *S. picilabris, sagitta, wallacei.*
Group 3: *S. matsumurae, cruciata.*

In group 1 the arcessus is narrow and tapers apically to a point with a wide basal bifurcation. In group 2 the arcessus also has a wide basal bifurcation but has a median expansion before tapering apically. As no males are known of *wallacei* its placing cannot be confirmed but it is tentatively



Figs 3–7 *Semachrysa minuta*. 3, head, lateral view; 4, head, frontal view; 5, labium, ventral view; 6, left maxilla, ventral view; 7, mandibles, ventral view. g = galea; 1 = ligula; 1p = labial palp; mxp = maxillary palp; p = papilla; sm = submentum.

included in this group on the basis of the markings of the head and mesothorax which closely resemble those of *picilabris* and *sagitta*. Moreover, in all group 2 species the crossvein between *Sc* and *R* is basal to the crossvein between cell m_1 and m_2. In all other species of the genus, except in a few specimens of *minuta*, this crossvein is apical to the m_1–m_2 crossvein. In group 3 the arcessus is broad, the basal bifurcation shallow and the dorsal surface grooved. It is difficult to suggest the phylogenetic relationships between these species or these groups but as more males are discovered they will probably become clearer.

Biology

The larvae and biology are known for only one species of *Semachrysa*. Kuwana (1922) described the larva of *matsumurae* as long and slender with the abdomen gradually tapering apically to a point. Length about 5·5 mm. Head small with long, curved, pointed mandibles, antenna with

fine hairs. Abdomen with a prominent lateral wart on each segment, each bearing a few long setae. Dorsum with fine setae usually carrying dead skins of coccids and aphids. Abdomen pale brownish yellow. Pupa pale green, curved ventrally into a ball. Cocoon white, spherical, 3·3 mm in diameter. Life-cycle bivoltine. The larvae fed on the coccid *Icerya purchasi* Maskell but sometimes also on larvae of the coccinellid *Rodolia cardinalis* (Mulsant), a species introduced to Japan to control *I. purchasi*. The larva of *Semachrysa matsumurae* has also been figured by Yoshida (1917).

Geographical distribution

The species of *Semachrysa* are distributed (Fig. 8) from Sri Lanka, the Khasia Hills (Assam), southern China, Japan, Malaysia, Philippines, Indonesia and northern Australia to the New Hebrides. They do not appear to be common but usually form a small percentage of the Neuroptera collected in any suitable habitat.

Checklist of species of *Semachrysa*

claggi (Banks) **comb. n.**
contorta **sp. n.**
cruciata (Esben-Petersen) **comb. n.**
dammermanni (Esben-Petersen) **comb. n.**
decorata (Esben-Petersen) **comb. n.**
rectoides (Banks) **syn. n.**
hyndi **sp. n.**
matsumurae (Okamoto) **comb. n.**
minuta **sp. n.**
nigribasis (Banks) **comb. n.**
papuensis **sp. n.**
picilabris (Kimmins) **comb. n.**
polysticta **sp. n.**
sagitta **sp. n.**
wallacei **sp. n.**

Key to species of *Semachrysa*

1 Wings unmarked except for indistinct small spot on *dcc* and black border on costa (Fig. 81). Mesonotum and metanotum without black or brown markings ***dammermanni*** (p. 22)
– Wings with numerous brown spots. Mesonotum with at least one black or brown spot above wing base 2

2 (1) Fore wing with strong dark brown spot at base of outer gradate series 3
– Fore wing with no spots in this position (though very faint shading may be present) 4

3 (2) Large dark brown spot present on fourth posterior marginal crossvein of fore wing. Small spot present on Cu_2 (Fig. 26). Male genitalia with arcessus narrow, not ridged (Fig. 29). Female genitalia with duct of spermatheca twisted and vela very long (Fig. 34) ..... ***contorta*** (p. 13)
– Small spot present on fourth posterior marginal crossvein of fore wing but with large brown spot on *dcc* (Fig. 53). Male genitalia with arcessus broad and ridged. Female genitalia with duct of spermatheca and vela short (Figs 57, 61) ..... ***matsumurae*** (p. 17)

4 (2) Single median spot on vertex behind antennae 5
– No spot on vertex in this position 6

5 (4) Hind wing with large brown spot on *dcc* and faint shading on posterior forked marginal crossveins ..... ***wallacei*** (p. 24)
– Hind wing with only faint marks on *dcc* or forked marginal crossveins but brown spot present on fourth posterior marginal crossvein ..... ***picilabris*** (p. 16)

6 (4) Prominent spot at base of inner gradate series of fore wing and on fourth posterior marginal crossvein. Male with abdominal setae dense and fine (Figs 20, 21) ***papuensis*** (p. 12)

Fig. 8 Distribution map of *Semachrysa*.

–		Fore wing without this combination of markings though pale suffusion may be present in these positions	7
7	(6)	Three spots on frons below antennae	8
–		Two spots on frons below antennae	***cruciata*** (p. 19)
8	(7)	Brown band extending along inner edge of eye from postocular lobe to anterior edge of vertex	***polysticta*** (p. 23)
–		Brown band absent; isolated spot on postocular lobe	9
9	(8)	Fore and hind wing lightly suffused, particularly along posterior margins (Fig. 9), distinct spots absent	***minuta*** (p. 10)
–		Fore and hind wing lightly suffused but distinct spots also present	10
10	(9)	Darkest spot on fore wing on *dcc*	11
–		Darkest spot on fore wing on fourth posterior marginal crossvein	12
11	(10)	Spot on *dcc* in fore wing large, extending from anal veins to second cubital cell (c_2). Many crossveins with pale suffusion including *Rs* and inner gradates (Fig. 42)	***sagitta*** (p. 15)
–		Spot on *dcc* in fore wing small, not extending to anal veins or c_2. All crossveins pale (Fig. 73)	***nigribasis*** (p. 20)
12	(10)	Small species; fore wing 7·5 mm, with four inner gradate and five outer gradate crossveins	***hyndi*** (p. 11)
–		Larger species; fore wing 9 mm or more with at least five outer gradate and six inner gradate crossveins	13

13 (12) Fore wing 9 mm with faint spot on *dcc* and extensive suffusion (Fig. 35). Female spermatheca with deep ventral impression (Fig. 41) ..... ***decorata*** (p. 14)
Fore wing 13 mm, no marks on *dcc* or suffusion (Fig. 77). Female spermatheca with shallow ventral impression ..... ***claggi*** (p. 21)

Semachrysa minuta sp. n.

(Figs 3–7, 9–15)

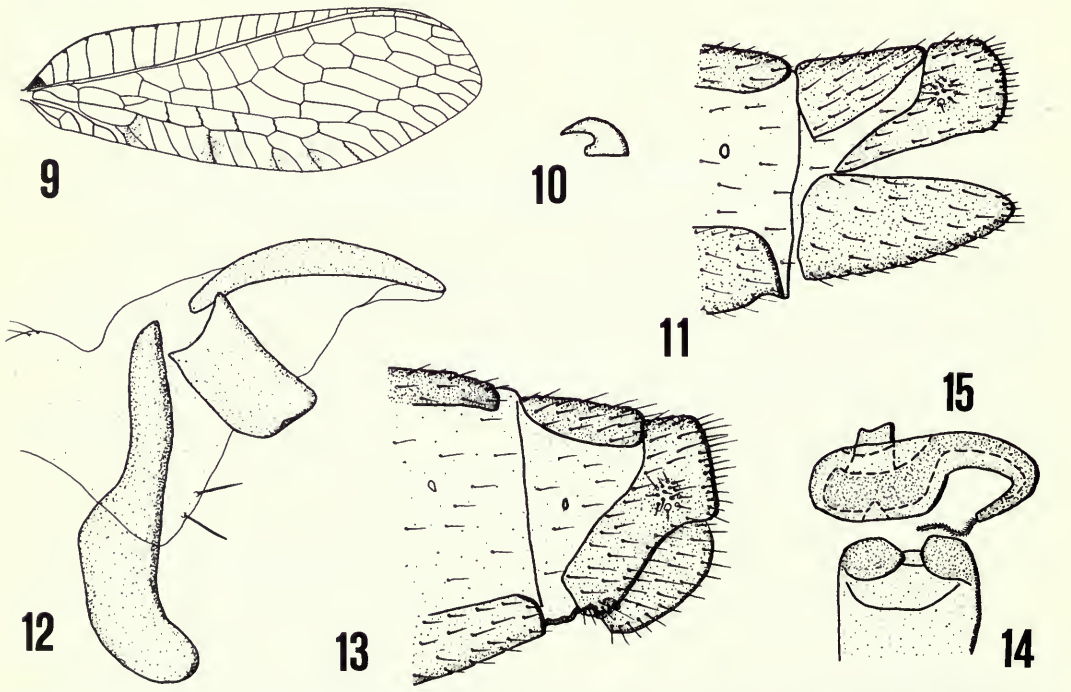
[*Chrysopa nigribasis* Banks; Banks, 1931: 414. Misidentification.]

♂. Head as in Figs 3–7. Markings as figured or with clypeus unmarked dorsally. Often with lateral brown stripe at base of scape. Apical segment of maxillary palp with brown band. Antenna longer than fore wing. Mesonotum with brown spot above wing base and on mesoprescutum. Metanotum often with brown spot above base of hind wing. Claw with slight basal dilation (Fig. 10). Fore wing (Fig. 9) 8 mm, narrow; costa black, sometimes as far as seventh crossvein; pale brown spots on *dcc*, fourth posterior marginal crossvein, forking marginal crossveins, *Psm* crossveins. Hind wing 7 mm; markings as in fore wing.
♀. Markings as in male.

GENITALIA ♂ (Figs 11, 12). Trichobothria 11–14. Arcessus curving ventrally, subacute apically with wide basal bifurcation. Entoprocessus long and curved inwardly.

GENITALIA ♀ (Figs 13–15). Trichobothria 14–16. Subgenital plate parallel-sided. Spermatheca narrow; vela short; ventral impression shallow.

REMARKS. *S. minuta* may be distinguished by the absence of any dark brown markings on the wings, though faint spots are numerous. *S. dammermanni,* which has only a faint spot on *dcc*, has no markings on the thorax, whereas in *minuta* there are dark markings on the mesothorax. *S. minuta* is also smaller than any other species of *Semachrysa* except *hyndi*. The latter may be distinguished by the prominent dark brown spot on the fourth posterior marginal crossvein which is lightly shaded in *minuta*.



Figs 9–15 *Semachrysa minuta*. 9, fore wing venation; 10, claw; 11, apex of ♂ abdomen, lateral view; 12, ♂ genitalia, lateral view; 13, apex of ♀ abdomen, lateral view; 14, ♀ subgenital plate, ventral view; 15, ♀ spermatheca, lateral view.

Several of the specimens examined from Borneo had been identified by Banks as *nigribasis* and are probably those to which he refers (Banks, 1931). However, *minuta* can be distinguished from *nigribasis* by the absence of a dark brown spot on *dcc*, fewer gradate crossveins and half as many trichobothria.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Samawang, nr Sandakan, 15.vii.1927 (*C. B. K. & Pendlebury*) (BMNH).

Paratypes. **Borneo**: 1 ♂, 5 ♀, data as holotype, 9–15.vii.1927 (BMNH). **West Malaysia**: 1 ♀, Kuala Lumpur, 30.vi.1935 (*Pendlebury*) (MCZ); 1 ♀, 28.i.1935, at light (*Pendlebury*) (BMNH); 1 ♂, Selangor, Ulu Langat, at light, 1.ix.1934 (BMNH). **Sumatra**: 1 ♂, Aur Kumanis, iii.1915 (*Jacobson*) (RNH).

Material excluded from the type-series. **Burma**: 1 ♀, Tenasserim Valley (*Doherty*) (BMNH).

Semachrysa hyndi sp. n.

(Figs 16–19)

♂. Head with dark brown marking extending dorsally and basally around clypeus. Dark brown stripe at base of scape extending on to head and continuous with spot on frons below each antenna; spot between antennae faint. Mesonotum with broad dark brown stripe across mesoscutum and mesoprescutum. Metanotum unmarked. Claws without basal dilation. Fore wing (Fig. 16) 7·5 mm; brown spot on fourth posterior marginal crossvein; faint shading on *dcc*, gradates, basal branch of 1*A* and *Psm* crossveins. Other veins green except base of *Rs*, radial crossveins below pterostigma, first costal crossvein and costa to first crossvein, brown; *im* short. Hind wing 6·5 mm; faint shading on alternate marginal crossveins and gradates.

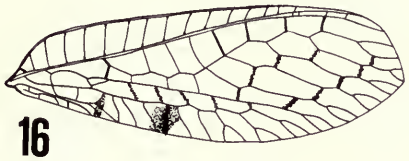
♀. Unknown.

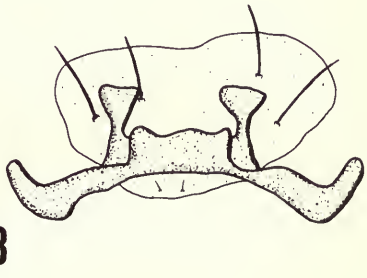
GENITALIA ♂ (Figs 17–19). Trichobothria 16. Gonarcus with submedian tooth. Arcessus narrow, similar to *minuta*.

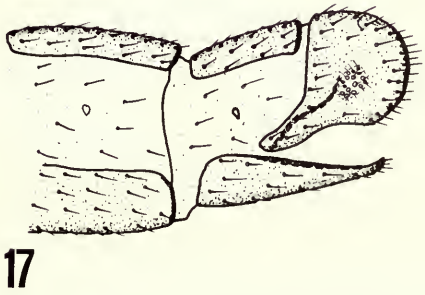
REMARKS. This species resembles *minuta* in wing venation, size and genitalia, but is distinguished by the presence of a dark brown spot on the fourth posterior marginal crossvein. The unique specimen was taken on vegetation in a jungle ravine.

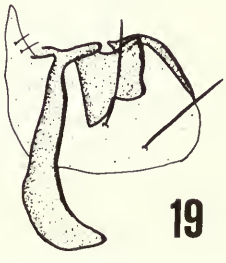
MATERIAL EXAMINED

Holotype ♂, **Sri Lanka**: Sabaragamuwa Province, Deerwood, Kuruwita, 9 km NNW. Ratnapura, 18.ii.1962 (*Brinck, Andersson & Cederholm*) (ZI).









Figs 16–19 *Semachrysa hyndi*. 16, fore wing venation; 17, apex of ♂ abdomen, lateral view; 18, ♂ genitalia, dorsal view; 19, ♂ genitalia, lateral view.

Semachrysa papuensis sp. n.

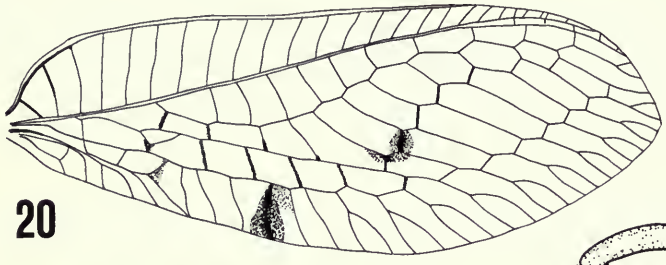
(Figs 20–25)

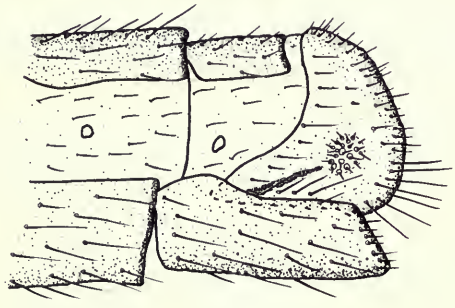
♂. Head with dark brown markings extending from gena to clypeus. White band across frons. Maxillary palp with apical segment exceptionally long and slender. Mesonotum with broad dark brown band across mesoscutum, becoming paler on mesoprescutum. Metanotum unmarked. Claws with slight basal dilation. Fore wing (Fig. 20) 12 mm, broad. Costa dark to third crossvein; large brown spot on fourth posterior marginal crossvein and on two basal inner gradates; pale shading on *dcc* and *Psm* crossveins; gradate crossveins brown, other crossveins green. Hind wing 11 mm. Crossveins green except outer gradate series, brown.

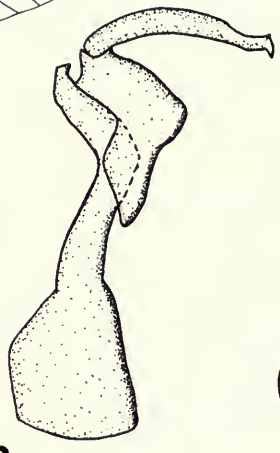
♀. Markings as in male, though brown facial markings may extend above clypeus.

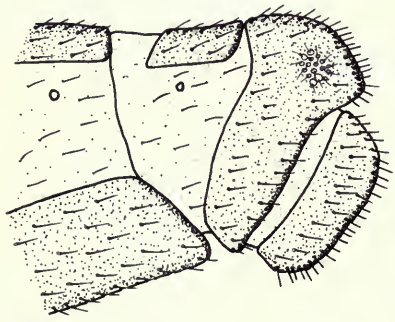
GENITALIA ♂ (Figs 21, 22). Trichobothria 20. Abdominal setae dense, long. Arcessus narrow with small dorso-apical spine.

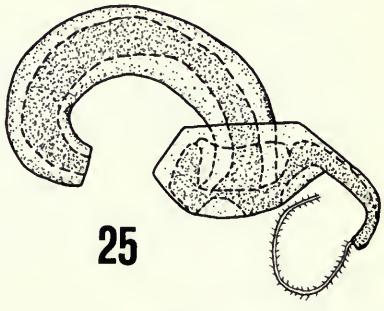
GENITALIA ♀ (Figs 23–25). Trichobothria 17. Subgenital plate broad. Spermatheca long, narrow. Vela long, curved. Ventral impression shallow.











Figs 20–25 *Semachrysa papuensis*. 20, fore wing venation; 21, apex of ♂ abdomen, lateral view; 22, ♂ genitalia, lateral view; 23, apex of ♀ abdomen, lateral view; 24, ♀ subgenital plate, ventral view; 25, ♀ spermatheca, lateral view.

REMARKS. This large species is the only member of the genus with dark brown markings on both the fourth posterior marginal crossvein and the first two crossveins of the inner gradate series in the fore wing.

MATERIAL EXAMINED

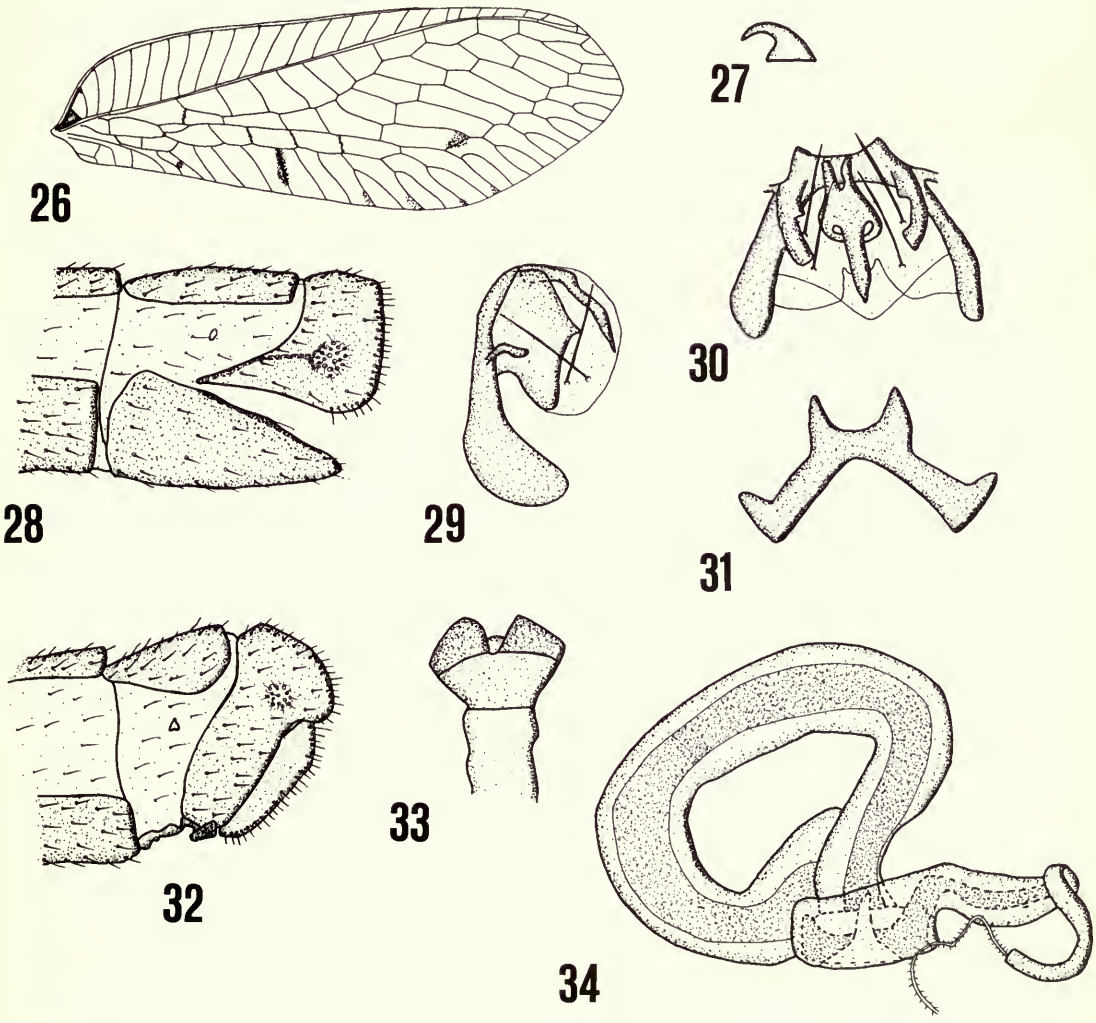
Holotype ♂, **New Guinea**: Lower Mist Camp, 1500 m, 29.i.1939 (*Toxopeus*) (RNH).

Paratypes. **New Guinea**: 1 ♂, Star Range, 1500 m, 3.vii.1959 (RNH); 1 ♀, Mafulu, 1500 m, xii.1933 (*Cheesman*) (BMNH).

Semachrysa contorta sp. n.

(Figs 26–34)

♂. Head with brown stripe on lateral and dorsal edge of clypeus. Spot on frons between antennae large and triangular. Frons often with white transverse band. Scape and pedicel with lateral brown stripe extending onto head. Brown spot on mesoscutum; mesoprescutum pale brown often marked with darker brown spots. Metanotum unmarked. Claws without basal dilation (Fig. 27). Fore wing (Fig. 26) 8–10 mm. Costa



Figs 26–34 *Semachrysa contorta*. 26, fore wing venation; 27, claw; 28, apex of ♂ abdomen, lateral view; 29, ♂ genitalia, lateral view; 30, ♂ genitalia, caudal view; 31, ♂ gonarcus, dorsal view; 32, apex of ♀ abdomen, lateral view; 33, ♀ subgenital plate, ventral view; 34, ♀ spermatheca, lateral view.

dark to second costal crossvein; wing marked with brown spots on basal and, sometimes, second outer gradate, fourth posterior marginal crossvein, with smaller spots on base of *Rs*, forking marginal crossveins and between branches of Cu_2. Hind wing 7·0–8·5 mm; unmarked.

♀. Markings as in male.

Genitalia ♂ (Figs 28–31). Trichobothria 16–21. Arcessus narrow with wide basal bifurcation and lateral projections. Gonarcus with prominent submedian tooth.

Genitalia ♀ (Figs 32–34). Trichobothria 15. Spermathecal duct coiled once; vela very long and curved; ventral impression very deep. Subgenital plate narrow, widening basally.

Remarks. The wing markings separate this species from *matsumurae*, which it closely resembles. *S. contorta* has a small spot between the branches of Cu_2 and a large spot on the fourth posterior marginal crossvein. In *matsumurae* the spot between the branches of Cu_2 extends to *dcc* and the spot on the fourth posterior marginal crossvein is small.

Material examined

Holotype ♂, **India**: Assam, Khasia Hills (BMNH).

Paratypes. **India**: 5 ♂, 1 ♀, data as holotype (BMNH); 1 ♀, Assam, Khasia Hills 1907 (RNH).

Material excluded from the type-series. **India**: 2 ex., data as holotype (abdomens missing) (BMNH).

Semachrysa decorata (Esben-Petersen) **comb. n.**

(Figs 35–41)

Chrysopa decorata Esben-Petersen, 1913: 260. LECTOTYPE ♀, Taiwan (IP), here designated [examined].

[*Chrysopa nigribasis* Banks; Banks 1939*a*: 138. Misidentification.]

Chrysopa (Indochrysa) nigribasis var. *rectoides* Banks, 1939*b*: 471. Holotype ♀, China (MCZ) [examined]. **Syn. n.**

♂. Head with black marking on gena extending basally, laterally and dorsally around clypeus, leaving lateral pale spot on clypeus and median spot below, reminiscent of *S. minuta* (Fig. 4). Frons white, median spot on frons large, triangular; each lateral spot extending dorsally to outer lateral base of scape. Scape marked laterally with brown stripe. Antenna longer than fore wing. Maxillary palp with black dorsal marking at distal end of each segment; apical segments of maxillary and labial palps black. Mesoscutum with extensive brown markings; mesoprescutum marked pale brown with several darker brown spots. Claws with basal dilation. Fore wing (Fig. 35) 8·5 mm. Costa black to second crossvein. Large black-brown spot on fourth posterior marginal crossvein with smaller spots on *dcc*, base of *Rs, im*. Faint shading on *Psm* crossveins and posterior forking marginal veins. All other veins pale. Hind wing 8·0 mm, unmarked.

♀. Marked as in male with additional dark shading in fore wing on 1*A* and radial crossveins below pterostigma. Fore wing 9 mm. Hing wing 8·5 mm. Faint shading on marginal crossveins and gradates.

Genitalia ♂ (Figs 36–38). Trichobothria 12. Gonarcus with submedian tooth and slender lateral extensions. Entoprocessus axe-shaped. Arcessus narrow and tapering apically with four dorsal setae.

Genitalia ♀ (Figs 39–41). Trichobothria 18. Spermatheca broad; vela short, slightly curved; ventral impression very deep; spermathecal duct with one twist.

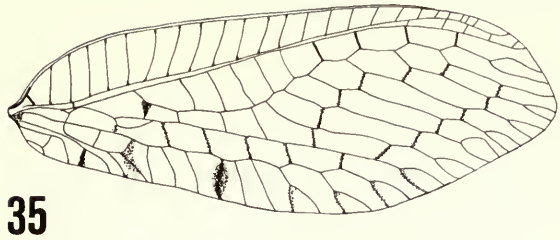
Remarks. Banks (1939*b*) misidentified specimens of *matsumurae* (p. 17) as *decorata*, consequently he described true *decorata* as *nigribasis* var. *rectoides*.

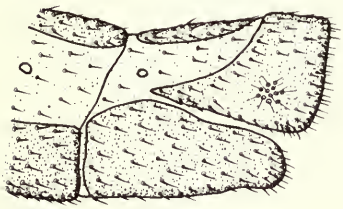
Females of *decorata* may be distinguished by the very deep ventral impression and the relatively short vela and spermathecal duct which are not found together in any other species. The male may be distinguished by the presence of setae on the arcessus which are not found, in this position, in any other species of the genus. This species is also characterized by the dark spots on the mesoprescutum. Kuwayama (1962) states that in Japan it is on the wing during September.

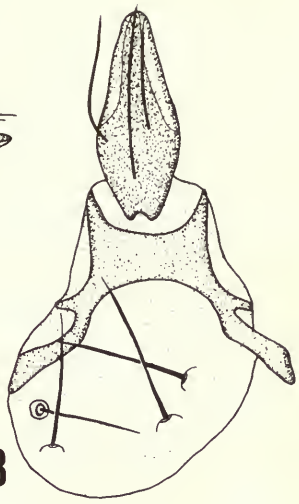
Distribution. China (Hainan Dao I.), Taiwan, Japan (Kuwayama, 1962), West Malaysia, Philippines (Banks, 1939*a*; 1939*b*).

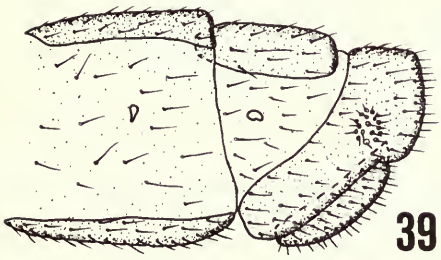
Material examined

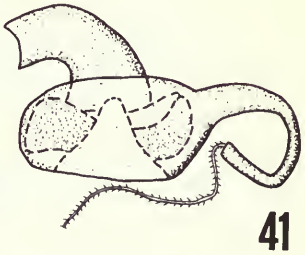
Chrysopa decorata Esben-Petersen, lectotype ♀, **Taiwan**: Kosempo, 1911 (*Sauter*) (IP). *Chrysopa*











Figs 35–41 *Semachrysa decorata*. 35, fore wing venation; 36, apex of ♂ abdomen, lateral view; 37, ♂ genitalia, lateral view; 38, ♂ genitalia, dorsal view; 39, apex of ♀ abdomen, lateral view; 40, ♀ subgenital plate, ventral view; 41, ♀ spermatheca, lateral view.

(Indochrysa) nigribasis var. *rectoides* Banks, holotype ♀, **China**: Hainan Dao I., Dwa Bi, 20.vii.1935 (*Gressitt*) (MCZ).

West Malaysia: 1 ♂, W. Pahang, Genting Tea Estate, 650 m, 11–29.xi.1981 (*Tuck*) (BMNH).

In the original description of *decorata*, Esben-Petersen (1913) lists two specimens. However, only one is present at IP; the other, apparently, is lost (The Director, IP, *in litt.*).

Semachrysa sagitta sp. n.

(Figs 42–45)

[*Chrysopa matsumurae* Okamoto; Kimmins, 1936: 87 (partim). Misidentification.]

♂. Head with brown markings extending from gena along dorsal edge of clypeus. Spot between antennae small, with those beneath each antenna larger. Scape unmarked. Mesonotum with brown spot above fore wing base and narrow stripe on mesoprescutum. Metanotum unmarked. Claws with slight basal dilation. Fore wing (Fig. 42) 10·5 mm. Costa dark to third crossvein; large brown spot on *dcc* with fainter shading on base of *Rs*, radial crossveins, fourth posterior marginal crossvein, gradates, *Psm* crossveins. Inner gradates

arched. Hind wing 9·0 mm, gradates brown with faint shading on fourth posterior marginal crossvein, forking marginal crossveins; other veins green.

♀. Unknown.

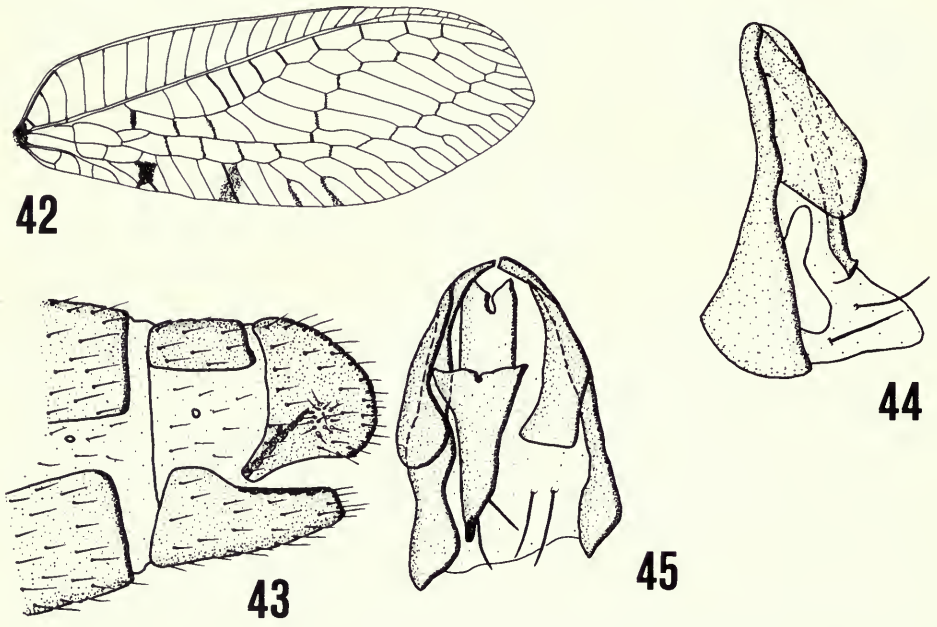
GENITALIA ♂ (Figs 43–45). Trichobothria 15. Arcessus with broad median expansion and small apical tooth.

REMARKS. The genitalia and markings of the fore wing are very similar to *picilabris* but *sagitta* may easily be distinguished from this species by the absence of a large spot on the hind wing and the absence of a median spot on the vertex immediately behind the antennae.

Kimmins (1936) misidentified three specimens from the New Hebrides as *Chrysopa matsumurae* Okamoto; of these, one is described here as *S. sagitta*, and the Erromanga specimen should be referred to *Chrysoperla* Steinmann. I have been unable to trace the Tangoa specimen.

MATERIAL EXAMINED

Holotype ♂, **New Hebrides**: Espiritu Santo I., Hog Harbour, 7.vii.1925 (*Buxton*) (BMNH).



Figs 42–45 *Semachrysa sagitta*. 42, fore wing venation; 43, apex of ♂ abdomen, lateral view; 44, ♂ genitalia, lateral view; 45, ♂ genitalia, caudal view.

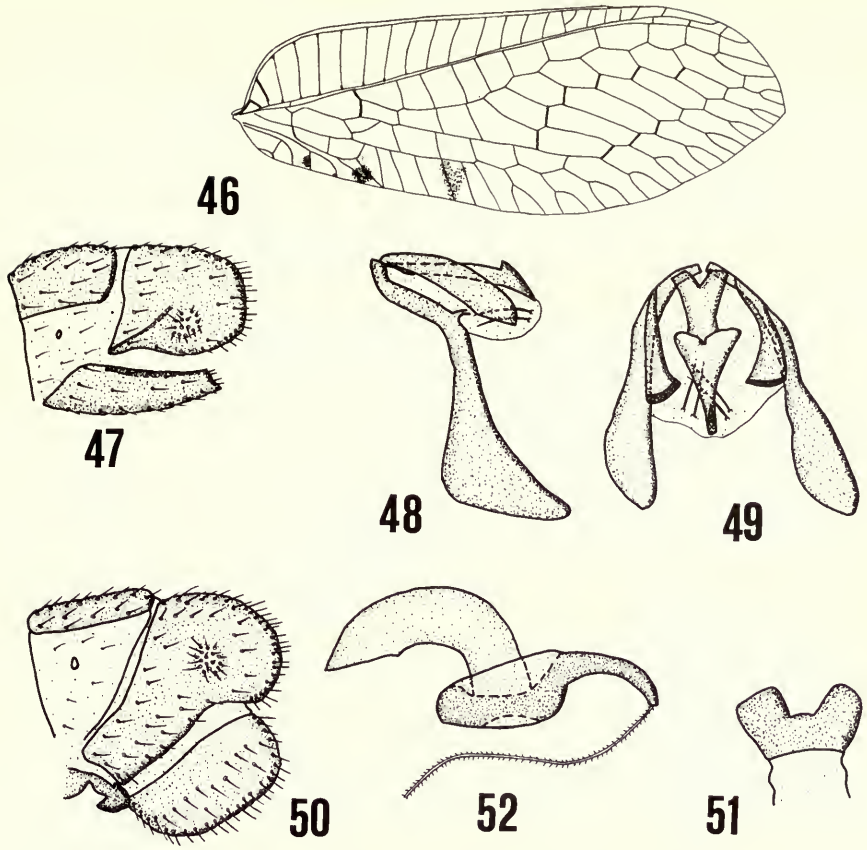
Semachrysa picilabris (Kimmins) **comb. n.**

(Figs 46–52)

Ankylopteryx picilabris Kimmins, 1952*a*: 77. Holotype ♀ [not ♂], AUSTRALIA (BMNH) [examined].

♂. Head narrow with brown mark around lateral edge of clypeus, not continuous with spot on gena. Brown median spot on vertex immediately behind antennae in addition to three on frons below antennae. Spot on frons between antennae faint. Scape unmarked. Mesonotum with brown spot above fore wing base, narrow stripe on mesoprescutum. Metanotum unmarked. Claws with slight basal dilation. Fore wing (Fig. 46) 9·5 mm. Costa dark to first crossvein; dark brown spot between branches of *Cu* extending to *dcc*; faint shading on fourth posterior marginal crossvein and branches of 1*A*. Other crossveins green except basal costals, base of *Rs*, inner gradates, radial crossveins below pterostigma, brown. Inner gradate series arched. Hind wing 8·5 mm, marked with small dark brown spot on fourth posterior marginal crossvein.

♀. Markings as in male.



Figs 46–52 *Semachrysa picilabris*. 46, fore wing venation; 47, apex of ♂ abdomen, lateral view; 48, ♂ genitalia, lateral view; 49, ♂ genitalia, caudal view; 50, apex of ♀ abdomen, lateral view; 51, ♀ subgenital plate, ventral view; 52, ♀ spermatheca, lateral view.

GENITALIA ♂ (Figs 47–49). Trichobothria 15. Arcessus downcurved with broad median expansion and apical spine. Gonarcus sinuous. Gonosetae short, curved, situated close to apex of arcessus, projecting anteriorly.

GENITALIA ♀ (Figs 50–52). Trichobothria 17. Subgenital plate with small median projection. Spermatheca narrow, duct short; vela large, curved; ventral impression shallow.

REMARKS. Externally this species is very similar to *wallacei* from which it differs by lacking a spot on *dcc* in the hind wing. The marking between the branches of Cu_2 is more extensive in *wallacei* than in *picilabris* and in the latter the apical crossvein of cell c_2 is green; in *wallacei* this vein is brown.

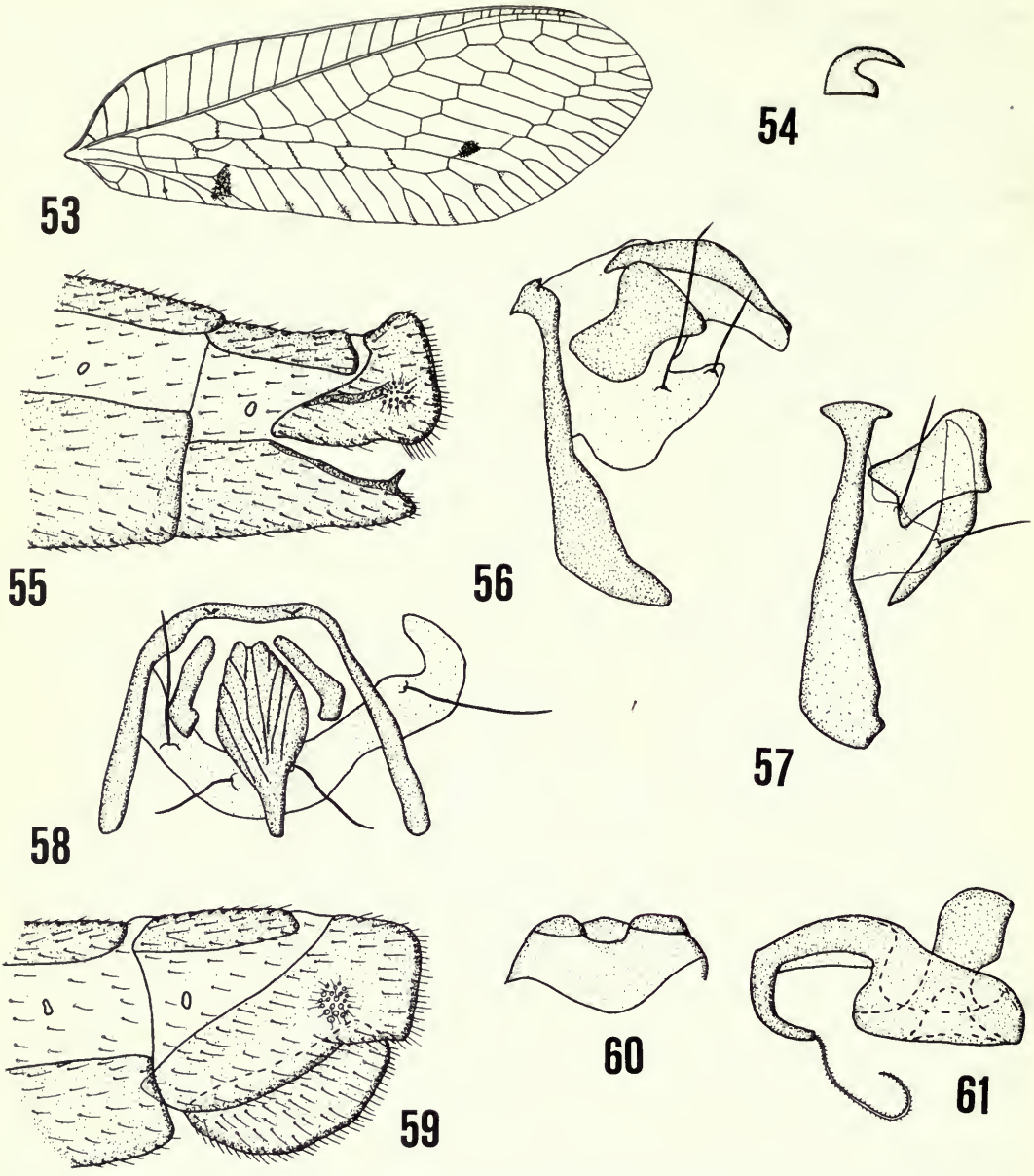
MATERIAL EXAMINED

Holotype ♀, **Australia**: north Queensland, Tully, 12.vi.1931 (*Franzen*) (BMNH).
Paratypes. 1 ♂, 1 ♀, same data as holotype (BMNH).

Semachrysa matsumurae (Okamoto) **comb. n.**

(Figs 53–64)

Chrysopa matsumurae Okamoto, 1914: 68. Lectotype ♀, JAPAN: Kyushu, Moji, 18.v.1906 (EIHU), designated by Kuwayama (1966: 136) [not examined].
[*Chrysopa decorata* Esben-Petersen; Banks, 1939*b*: 470. Misidentification.]



Figs 53–61 *Semachrysa matsumurae,* Japan. 53, fore wing venation; 54, claw; 55, apex of ♂ abdomen, lateral view; 56, 57, ♂ genitalia, lateral view; 58, ♂ genitalia, caudal view; 59, apex of ♀ abdomen, lateral view; 60, ♀ subgenital plate, ventral view; 61, ♀ spermatheca, lateral view.

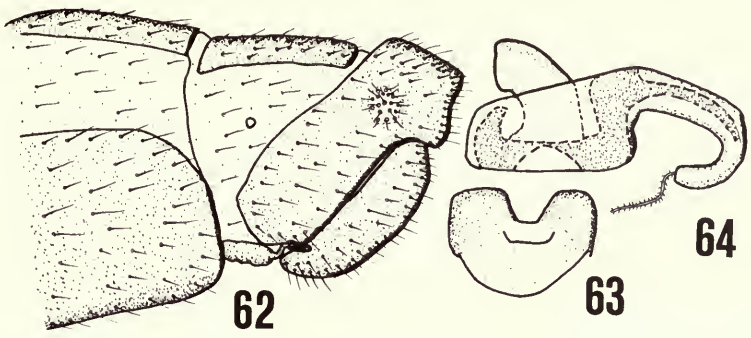
♂. Head with dark brown marking extending from gena along dorsal edge of clypeus; additional spot between antenna and eye. Scape and pedicel marked laterally with pale brown stripe. (In Khasia Hills specimens scape and pedicel unmarked in all but one specimen.) Antenna as long as or longer than fore wing. Apical segment of maxillary palp usually with brown stripe. Mesonotum with broad brown band extending across mesoscutum and mesoprescutum. Metanotum unmarked. Claws with basal dilation (Fig. 54). Fore wing (Fig. 53) 9·5–12·5 mm. Costa black to third crossvein; brown spot on basal outer gradate and at base of *dcc*, other veins green; additional faint shading on second and fourth posterior marginal crossveins, *Psm* crossveins, basal four radial crossveins, 1*A*, basal inner gradate vein. In one specimen

additional spot on second outer gradate vein. Hind wing 8–10 mm. Abdomen green dorsally, brown ventrally.

♀. Markings as in male.

GENITALIA ♂ (Figs 55–58). Trichobothria 16–21. Apodeme of sternite 8+9 forked. Gonarcus with small tooth in submedian area. Arcessus ovoid with dorsal grooves, basal bifurcation slight. Entoprocessus rectangular, narrowing medially.

GENITALIA ♀ (Figs 59–64). Trichobothria 18–23. Subgenital plate broad. Spermathecal duct short; ventral impression moderately deep; vela prominent and curved. (In specimens from Khasia Hills, Assam (Figs 62–64), ventral impression less pronounced and subgenital plate not as broad.)



Figs 62–64 *Semachrysa matsumurae,* Khasia Hills. 62, apex of ♀ abdomen, lateral view; 63, ♀ subgenital plate, ventral view; 64, ♀ spermatheca, lateral view.

REMARKS. I was unable to examine the lectotype of this species but received a detailed description and drawings from Mr S. Tsukaguchi. From this description it is obvious that the specimens I received from MCZ and which had been determined as *decorata* by Banks (1939*b*) are, in fact, *matsumurae*.

This species superficially resembles *contorta* but may be distinguished by the markings of the fore wing and differences in the genitalia. In *matsumurae* the spot on *dcc* is large, and extends to Cu_2, and that on the fourth posterior marginal crossvein is small. In *contorta* there is a small spot on Cu_2, whilst that on the fourth posterior marginal crossvein is large. In the male the arcessus is dorsally ridged in *matsumurae* but not in *contorta*. In the female the vela is short in *matsumurae* in contrast to the long vela of *contorta*.

MATERIAL EXAMINED

Taiwan: 1 ♂, Shinten, 3.iv.1932; 1 ex. (abdomen missing), Hassenzan, 24.vi.1934. **China**: 1 ex. (abdomen damaged), Hainan Dao I., Ta Han, 23.vi.1935; 1 ♂, E. Guandong, Yim Na San, 11.vi.1936; 1 ♂, 1 ♀, SW. Fujian, Gang-ken, 23.vii.1936. **Japan**: 1 ♂, 1 ♀, Ryukyu Is, Okinawa I., 31.viii.1934 (*Gressitt*) (MCZ). **India**: 3 ♂, 2 ♀, 3 ex. (abdomens missing), Assam, Khasia Hills (BMNH).

Semachrysa cruciata (Esben-Petersen) **comb. n.**

(Figs 65–72)

Chrysopa cruciata Esben-Petersen, 1928: 228. Holotype ♀, SUMATRA (RNH) [examined].
Chrysopa (Indochrysa) cruciata Esben-Petersen; Banks, 1938: 226.

♂. Head with brown markings extending around lateral and dorsal edge of clypeus. No spot on frons between antennae. Small lateral brown stripe at base of scape. Mesonotum with broad, brown, longitudinal band on mesoscutum. Claws without basal dilation. Fore wing (Fig. 65) 7 mm, narrow. Costa dark to first crossvein; large pale brown spots on base of *Rs, dcc* and between branches of Cu_2, fourth posterior marginal crossvein; pale shading on inner gradates, forking marginal crossveins and radial crossveins below pterostigma. Inner gradates arched. Hind wing 6·5 mm. Veins green, unmarked.

♀. Markings as in male with additional small brown spot on mesoscutum.

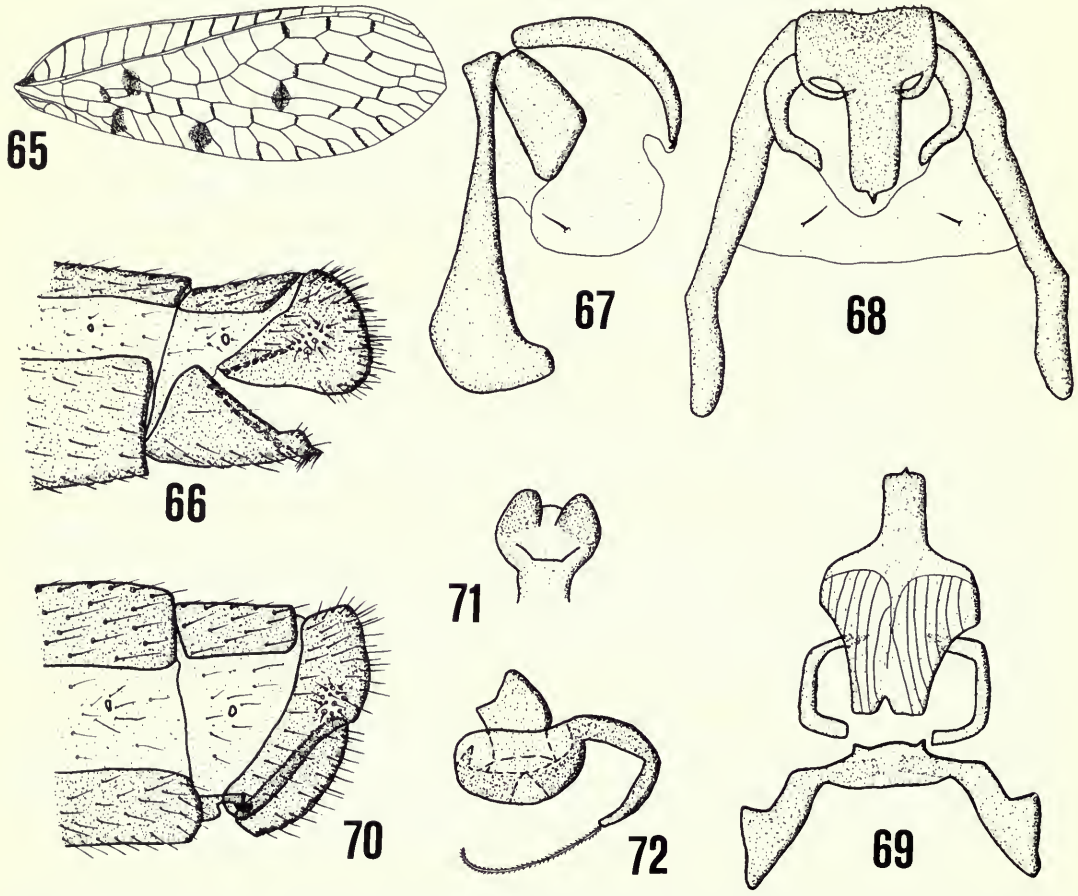
GENITALIA ♂ (Figs 66–69). Trichobothria 15. Tuft of setae at apex of sternite 8+9. Gonarcus with submedian tooth and median swelling. Arcessus broad, grooved dorsally. Only two, short gonosetae.

GENITALIA ♀ (Figs 70–72). Trichobothria 14. Spermatheca narrow; vela short; ventral impression deep.

REMARKS. *S. cruciata* can be distinguished by the large brown spot over *Rs* which is not found in any other species of the genus, except *polysticta*, from which it may be separated by the absence of a spot on the frons between the antennae. It is the only *Semachrysa* species in which the male has only one pair of lateral gonosetae.

MATERIAL EXAMINED

Holotype ♀, **Sumatra**: Lampung, Wai Lima Z., 9.xii.1921 (*Karny*) (RNH); 1 ♂, Engano I., ix–x.1890 (*Doherty*) (BMNH).



Figs 65–72 *Semachrysa cruciata*. 65, fore wing venation; 66, apex of ♂ abdomen, lateral view; 67, ♂ genitalia, lateral view; 68, ♂ genitalia, caudal view; 69, ♂ genitalia, dorsal view; 70, apex of ♀ abdomen, lateral view; 71, ♀ subgenital plate, ventral view; 72, ♀ spermatheca, lateral view.

Semachrysa nigribasis (Banks) **comb. n.**

(Figs 73–76)

Chrysopa nigribasis Banks, 1920: 337. Holotype ♀, WEST MALAYSIA (MCZ) [examined].
Chrysopa (Indochrysa) nigribasis Banks, 1938: 226.

♂. Unknown.

♀. Head with dark brown markings extending along dorsal edge of clypeus. Brown stripe on scape.

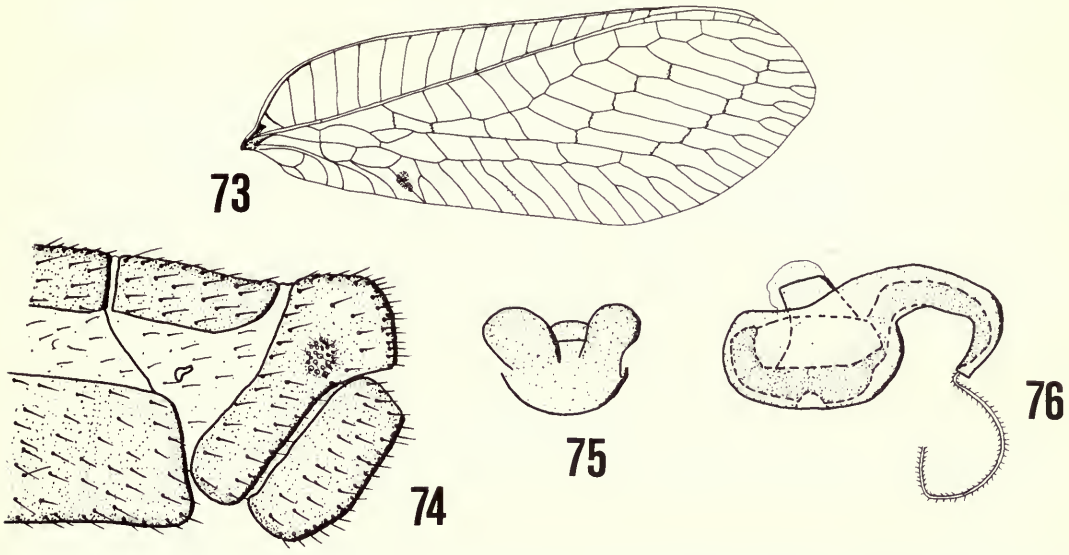
Mesonotum with narrow, transverse, brown stripe on mesoscutum and mesoprescutum. Metanotum unmarked. Claws with basal dilation. Fore wing (Fig. 73) 10 mm. Costa black to third costal crossvein; cell *im* long; gradates parallel; brown spot on *dcc*. Hind wing 9 mm, unmarked.

GENITALIA ♀ (Figs 74–76). Trichobothria 23. Subgenital plate outcurved. Spermatheca narrow; vela short; ventral impression shallow.

REMARKS. This species is distinguished by the absence of markings in the hind wing, while the fore wing has only a small spot on *dcc*.

MATERIAL EXAMINED

Holotype ♀, **West Malaysia**: Pinang I., Straits Settlements (*Baker*) (MCZ).



Figs 73–76 *Semachrysa nigribasis*. 73, fore wing venation; 74, apex of ♀ abdomen, lateral view; 75, ♀ subgenital plate, ventral view; 76, ♀ spermatheca, lateral view.

Semachrysa claggi (Banks) **comb. n.**

(Figs 77–80)

Ankylopteryx claggi Banks, 1937: 143. Holotype ♀, PHILIPPINES (MCZ) [examined].

♂. Unknown.

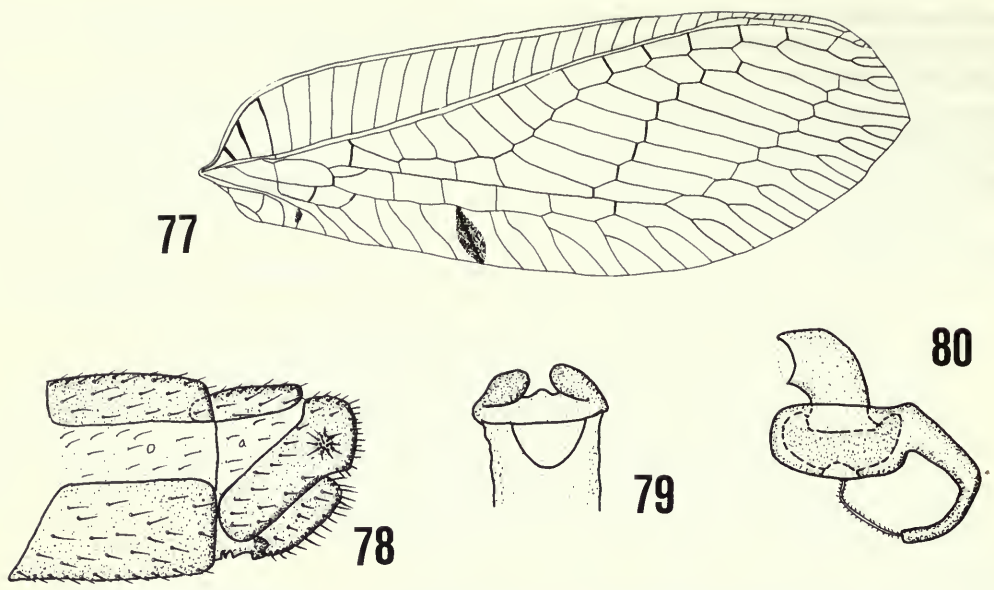
♀. Clypeus with small lateral brown spot continuous with brown mark on gena. Scape unmarked. Mesonotum with narrow, transverse, brown band across mesoscutum and mesoprescutum. Metanotum with pale brown spot above base of hind wing and two small spots on metaprescutum. Claws without basal dilation. Fore wing (Fig. 77) 13 mm, broad. Large brown spot on fourth posterior marginal crossvein, smaller spot on basal branch of 1*A*. Other veins green except inner gradates, radial crossveins below pterostigma, base of *Rs*, and basal costal crossveins, brown. Gradate series parallel. Costa dark to third crossvein. Hind wing 12 mm; small brown spot at base of *dcc* and fourth posterior marginal crossvein.

GENITALIA ♀ (Figs 78–80). Trichobothria 16. Subgenital plate broad, tapering apically. Spermatheca broad; vela short, slightly curved; ventral impression shallow.

REMARKS. This species has the largest wing span of the genus and may be distinguished by the large dark brown spot on the fourth posterior marginal crossvein and the smaller spot on the basal branch of 1*A*.

MATERIAL EXAMINED

Holotype ♀, **Philippines**: Mindanao, Davao, Mt. Mayo, 1500–1800 m, i. (*Clagg*) (MCZ).



Figs 77–80 *Semachrysa claggi.* 77, fore wing venation; 78, apex of ♀ abdomen, lateral view; 79, ♀ subgenital plate, ventral view; 80, ♀ spermatheca, lateral view.

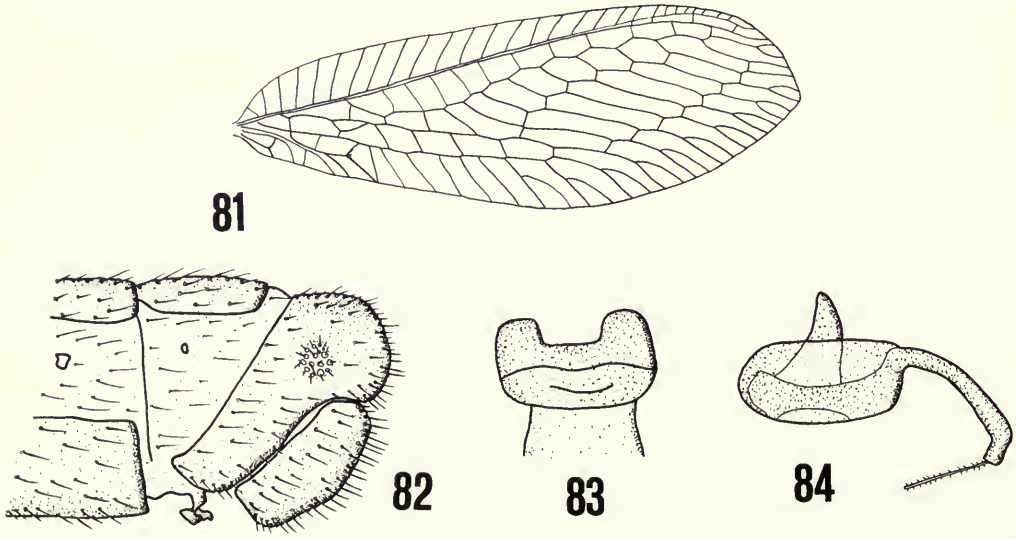
Semachrysa dammermanni (Esben-Petersen) **comb. n.**

(Figs 81–84)

Chrysopa dammermanni Esben-Petersen, 1929: 103. LECTOTYPE ♀, Buru I. (RNH), here designated [examined].

♂. Unknown.

♀. Dark brown spot on gena extending to lateral edge of clypeus. Spot on frons between antennae faint. Scape unmarked; antenna longer than fore wing. All palps unmarked. Mesonotum and metanotum unmarked. Claws with slight basal dilation. Fore wing (Fig. 81) 10 mm, unmarked except for indistinct



Figs 81–84 *Semachrysa dammermanni.* 81, fore wing venation; 82, apex of ♀ abdomen, lateral view; 83, ♀ subgenital plate, ventral view; 84, ♀ spermatheca, lateral view.

shading on *dcc* and costa black at base. Basal costal space only slightly enlarged. Hind wing 9 mm, unmarked. Veins green except gradates and radial crossveins below pterostigma, brown.

GENITALIA ♀ (Figs 82–84). Trichobothria 16. Subgenital plate broad. Spermatheca narrow, duct short; vela short; ventral impression shallow but broad.

REMARKS. This is the only speces in the genus in which the mesonotum and metanotum are unmarked.

MATERIAL EXAMINED

Lectotype ♀, **Buru I.**: Station 9, vii.1927 (*Toxopeus*) (RNH).
Paralectotype. 1 ex. (abdomen missing), same data as lectotype (RNH).

Semachrysa polysticta sp. n.

(Figs 85–88)

♂. Unknown.

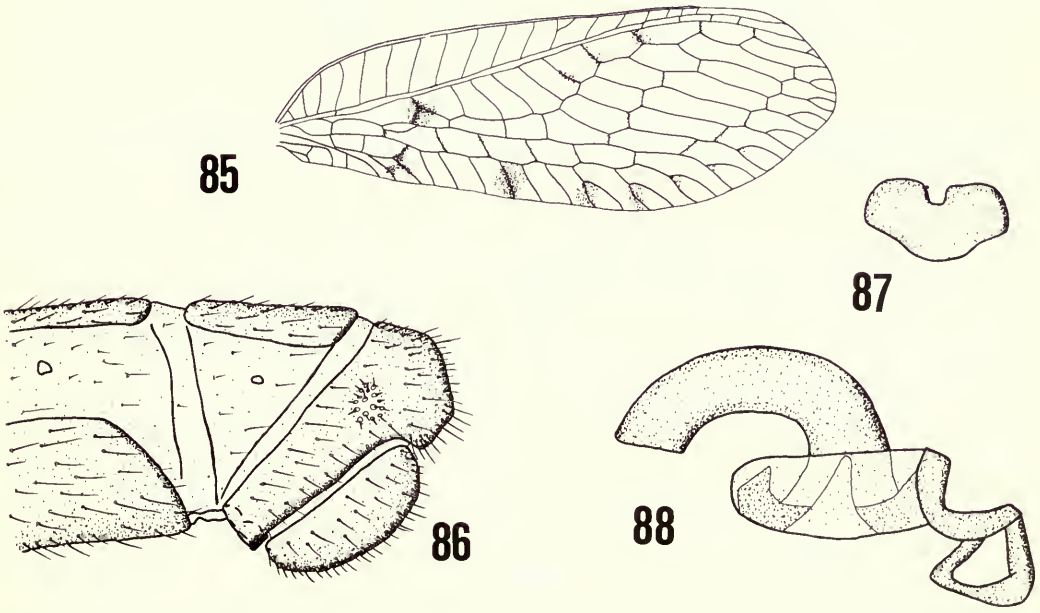
♀. Head with brown markings extending around lateral and dorsal edge of clypeus. Small lateral brown stripe on base of scape extending onto head. Brown mark on postocular lobe extending as band along edge of eye to anterior edge of vertex. Vertex with many small indentations. Apical segment of maxillary palp entirely brown. Mesonotum with two small isolated brown spots on mesoscutum and stripe on suture between mesoscutum and mesoprescutum. Fore wing (Fig. 85) 10 mm. Dark brown spots on base of *Rs*, *dcc* and fourth posterior marginal crossvein. Pale shading on radial crossveins below pterostigma, gradates and *Psm* crossveins. Hind wing 9 mm, unmarked except pale shading on alternate posterior marginal crossveins.

GENITALIA ♀ (Figs 86–88). Trichobothria 16. Spermatheca narrow, duct long, very twisted; vela long and curved; ventral impression very deep.

REMARKS. The fore wing is marked similarly to that of *cruciata*, but *polysticta* may be distinguished by the absence of a spot at the base of the inner gradate series. Other characteristics are the convoluted spermathecal duct and the deep ventral impression.

MATERIAL EXAMINED

Holotype ♀, **India**: Assam, Khasia Hills, no. 6, 1907 (RNH).



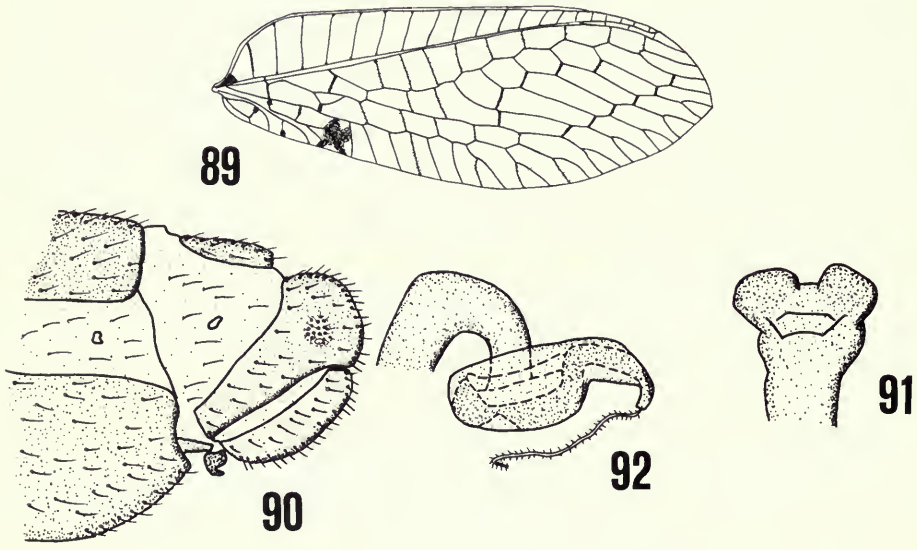
Figs 85–88 *Semachrysa polysticta*. 85, fore wing venation; 86, apex of ♀ abdomen, lateral view; 87, ♀ subgenital plate, ventral view; 88, ♀ spermatheca, lateral view.

Semachrysa wallacei sp. n.

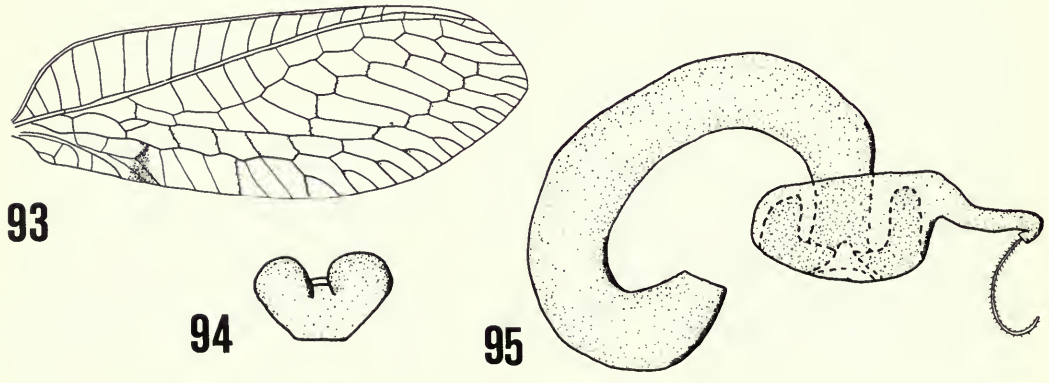
(Figs 89–95)

♂. Unknown.

♀. Head with clypeus almost entirely dark brown except for pale lateral spot. Additional median spot on vertex immediately behind antennae. Scape unmarked. Mesonotum with small brown mark on mesoscutum above base of fore wing and median spot adjacent to suture of mesoprescutum. Mesoprescutum with lateral, narrow, curving dark brown stripe and median pale brown spot on either side of dorsal suture. Metanotum unmarked. Claw with slight basal dilation. Fore wing (Figs 89, 93) 9 mm, narrow. Costa black to first costal crossvein. Other veins green except *Rs* crossveins, apical crossvein of cell c_2 and gradates, brown. Large dark brown spot on *dcc*, smaller brown spots on branches of 1*A* and basal branch of 2*A*, basal *Pcu* and *Psm* crossveins. Inner gradates arched. Hind wings broken and partly missing from type but large brown spot present on *dcc*. (New Guinea specimen with additional spots on alternate posterior marginal crossveins.) Hind wing 8·5 mm.



Figs 89–92 *Semachrysa wallacei,* Morotai I., 89, fore wing venation; 90, apex of ♀ abdomen, lateral view; 91, ♀ subgenital plate, ventral view; 92, ♀ spermatheca, lateral view.



Figs 93–95 *Semachrysa wallacei,* New Guinea. 93, fore wing venation; 94, ♀ subgenital plate, ventral view; 95, ♀ spermatheca, lateral view.

GENITALIA ♀ (Figs 90–92, 94, 95). Trichobothria 17. Subgenital plate broad and outcurved. Vela large, curved; ventral impression shallow. (New Guinea specimen with vela very long; ventral impression deep.)

REMARKS. This species is similar to *picilabris* but may be distinguished by the presence of the large spot on *dcc* in the hind wing.

The New Guinea specimen is very similar externally to the holotype of *wallacei*, but there are slight differences in the female genitalia, consequently it is excluded from the type-series.

MATERIAL EXAMINED

Holotype ♀, **Morotai I.** (*Wallace*) (BMNH).

Material excluded from the type-series. **New Guinea**: 1 ♀, Berhard Camp B, 100 m, 6.iv.1939 (*Toxopeus*) (RNH).

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ISSN 0524–6431

British Museum (Natural History)
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Synopsis

The Old World Iassine genus *Batracomorphus* Lewis is revised for the eastern Oriental and Australian regions and characters are given for its separation from the other genus of the tribe in this area. Descriptions are given of the males of each of the 188 known species, of which 161 are new, and a key is provided for their separation. The morphological variability, distribution and biology of the group in the area are discussed. Three new generic synonymies, three new specific synonymies and 18 new combinations are established, and one species and one genus raised from synonymy. A replacement name is provided for a junior secondary homonym. One lectotype is designated and 25 nomina dubia and one nomen nudum listed.

Introduction

The Cicadellidae is the largest family in the Homoptera, the 11,000 or more known species exceeding the combined total for the related groups Aphidoidea, Psylloidea and Aleyrodoidea. Unlike the Aphidoidea, which are mainly temperate, the Cicadellidae attains its maximum development and diversity in the tropics, resembling in this respect both the Psylloidea and Aleyrodoidea. As in these other groups, the species feed by sucking plant sap from the xylem, phloem or mesophyll cells and inflict damage to the host plant either directly or by the transmission of virus or virus-like diseases. Their economic importance as virus vectors is becoming increasingly recognised and a full account of the known vector species, diseases and host plants is given by Nielson (1968) and Maramorosch & Harris (1979). At the present time the Cicadellid fauna of the tropics is relatively little known and much basic taxonomy on the family is still to be carried out.

There are two characteristic features of most studies on Cicadellidae. Firstly, most species are

Bull. Br. Mus. nat. Hist. (Ent.) **47** (2): 27–210 Issued 24 November 1983

recognised almost solely by features of the male genitalia. Females are relatively uniform in structure and specific morphological characters are absent or indiscernible in most cases. This dependence upon the male genitalia for species delineation makes it difficult to fully assess evolutionary relationships between taxa at the species level. Thus evolutionary based studies, such as zoogeography, in individual genera can only be of limited value.

The other characteristic feature of studies on the Cicadellidae is the paucity of biological data, a phenomenon remarkable in a phytophagous group of this size and economic importance. This traditional reliance upon morphological characters appears to be due at least partly to the habits of the species themselves. Unlike the immatures of the Aphidoidea, Psylloidea and Aleyrodoidea, which are either sessile or relatively sedentary, Cicadellidae nymphs are very active and less easily observed or collected in direct association with the host-plant. The inability also to identify the nymphs and the difficulty of associating them with known adults either directly or by rearing are additional factors which further impede the accumulation of biological data. As a result, host plant relationships of most groups within the family are recorded only as broad generalisations. The Typhlocybinae, Macropsinae and Iassinae, for example, are mainly arboreal whilst the Deltocephalinae and Agalliinae are mainly associated with grasses and herbaceous plants. In Australia the Eurymelinae, Ledrinae, Austroagalloidinae and Tartessinae, together with the Iassine tribes Trocnadini and Reuplemmelini, are recorded as feeding mainly or exclusively on eucalypts whilst in North America and Europe the Idiocerinae are associated mainly with poplars and willows. The Ulopine tribe Cephalelini occurs exclusively on rushes of the family Restionaceae. On the rare occasion when specific host-plants are recorded no distinction is made between feeding, oviposition or resting hosts.

From the limited studies that have been carried out on such groups as the Macropsinae and Idiocerinae, the species are known to be restricted to single hosts or a small range of plant species. Field rearing and collecting carried out by Hepner at Mississippi State University in North America on the Typhlocybine genus *Erythroneura* Fitch has shown that, for oviposition, the species are restricted to woody plants and that many are host specific as well as having distinct spring and autumn food plants and summer oviposition hosts (Hepner, 1966–1978). Work by Claridge & Reynolds (1972) and Claridge, Reynolds & Wilson (1977) has also shown that the British species of tree-feeding *Oncopsis* Burmeister (Macropsinae) are all highly host specific in feeding and in particular in oviposition. Further work by Claridge & Wilson (1976) on the Typhlocybinae of woodland canopy in Great Britain has shown that most species of this subfamily have very restricted host plant associations and that many are monophagous. Later work (Claridge & Wilson, 1978*a*; 1978*b*) has demonstrated seasonal changes in oviposition preferences and host plant range in two bivoltine tree-feeding Typhlocybines, comparable to the host alternation of aphids.

The biological complexity of the Cicadellidae, as indicated by these pioneer studies, emphasises the importance of biological data in this family, not only as an aid to understanding phylogenetic relationships but more immediately as a means to interpreting morphological differences. The host-plant studies by Ross (1957) and Hepner (1966*a*), for example, reveal that in *Erythroneura* several taxa considered earlier to be single variable species proved to be a number of related species each with a very limited host range. The variability encountered in several Pacific species of *Batracomorphus,* as well as that recorded by Linnavuori & Quartau (1975) for some of the African ones, may possibly be due to the same phenomenon. Likewise the numerous *Batracomorphus* species occurring together in certain rain forest localities may be evidence of close host specificity, or simply attraction to a single species of food plant as discovered by Hepner (1976) for *Erythroneura* where 100 different species were taken from a single plant of *Ilex decidua*.

Biological studies in general require a sound taxonomic base of the kind available in Europe and North America. Such a base does not exist for tropical Cicadellidae at the present time. The present study, which is part of a larger one by the author of the family in the eastern Oriental and Australian regions, is a first step therefore in our understanding of one of the most commonly occurring and most variable of arboreal genera in the tropics of South East Asia. Although lacking the necessary biological data for full interpretation of the variability and distribution of

many of the species, the present work serves to highlight such problems and direct attention to where it is most needed. The study, and others like it such as those by Nielson (1975; 1977; 1982) on the Coelidiinae and Evans (1981) on the Tartessinae, will hopefully also provide the assistance and impetus for much needed biological studies in the tropics for comparison with those already carried out in the temperate regions of the world. It serves also as a comparison with the known African fauna and together with current work on that of the Indian subcontinent by Dr C. A. Viraktamath (pers. comm.) extends our knowledge of the genus throughout its range.

Batracomorphus is a large and predominantly tropical group of Iassine leafhoppers restricted to the Old World. Evans (1972) testified to the abundance of species in the Oriental region whilst Linnavuori & Quartau (1975) recorded 103 species for the Afrotropical region of which all but six were tropical. Quartau (1981*b*) later described a further 18 species from Africa of which 15 were tropical. Nast (1972) lists only 21 species for the whole of the Palaearctic region. The possible occurrence of the genus in the New World, as suggested by Linnavuori (1957; 1960*a* 1960*b*) and Kramer (1963), has been refuted by the more recent work of Blocker (1979).

The subfamily Iassinae itself comprises six tribes of which the Iassini is world-wide, the Platyjassini is confined to Madagascar, the Hyalojassini to South East Asia, the Reuplemmelini to Australia and New Guinea, the Trocnadini to Australia and the Selenomorphini to New Caledonia. Descriptions of the subfamily are given by Linnavuori & Quartau (1975) and Blocker (1979) in their revisions of the Afrotropical and Western Hemisphere species respectively, and Evans (1972; 1974) discusses the subfamily in the Oriental and Australian regions and gives a key to the tribes.

Only one other genus of the Iassini is known to occur in the eastern Oriental and Australian regions, namely *Thalattoscopus* Kirkaldy **gen. rev.** (type-species *T. dryas* Kirkaldy). The latter was synonymised with *Batracomorphus* by Linnavuori & Quartau (1975) but is here revived as a distinct genus with *Marquardtella* Schmidt **syn. n.** (type-species *M. krusei* Schmidt) as a new synonym. It occurs in Ceram, Mysol, New Guinea, Bismark Archipelago, Solomon Islands and Australia and may be distinguished from *Batracomorphus* by the spatulate and spinose subgenital plates.

Historical review

The first record of species of *Batracomorphus* in the Pacific area was by Walker (1870) who described *Bythoscopus unicolor* from Sulawesi and *Iassus coriaceus* from Mysol from material collected by A. R. Wallace. In the same year, Stål (1870) in a study of the Hemiptera of the Philippines described the first for that group of islands. It was not until 30 years later that the next species was described, by Kirby (1900) in a monograph of Christmas Island in the Indian Ocean.

The first major work on the leafhoppers of the Pacific was by Kirkaldy (1906) who described a new genus *Eurinoscopus* for seven new species from Australia. In a supplement to this work (Kirkaldy, 1907) he described an eighth species from Fiji. The synonymy between Kirkaldy's genus and *Batracomorphus* was first noted by Linnavuori (1957).

During the next two decades only four additional species were described from the Pacific area, from Australia (Distant, 1908*a*), the Bonin Islands (Matsumura, 1912), New Caledonia (Distant, 1920) and Buru (Schmidt, 1926). Eight years later Osborn (1934*a*), in *Insects of Samoa,* described a further five species and in the same year (Osborn, 1934*b*) three additional species from the Marquesas Islands. Further information on the Australian leafhoppers was provided by the many papers of J. W. Evans from 1931 to the present time. In 1935 he described two species of *Eurinoscopus* from Australia and two from Tasmania and a few years later two more from Australia (Evans, 1940 and 1941 respectively). Metcalf (1946), in a study of the leafhoppers of Guam, described two species whilst Linnavuori (1956), in a revision of some of Stål's and Spangberg's cicadellid types, described one from Sumatra.

The first extensive survey of the leafhoppers of the Pacific area was made by Linnavuori (1960*a*) who described a species from Kusaie and another from Palau. He recognised the similarity between *Batracomorphus* and Kirkaldy's genus *Eurinoscopus* and thereby drew the

attention of all subsequent workers to the presence of *Batracomorphus* in the Pacific area. In 1964 Blöte described seven species from New Guinea and two years later Evans (1966), in a monograph on the leafhoppers of Australia and New Zealand, described the first from New Zealand. The most recent contribution to our knowledge of the genus in the Pacific was also by Evans (1972) who described six more species from the Australian region. In the same work he described two new monotypic genera, *Acojassus* and *Edijassus*, as well as five additional species of *Batracomorphus* from New Guinea which belong to *Thalattoscopus*.

Abbreviations of depositories

The specimens studied in the course of this revision are deposited in the following institutions whose names are abbreviated in the text as follows:

AM	The Australian Museum, Sydney, Australia.
AMNH	American Museum of Natural History, New York, U.S.A.
BMNH	British Museum (Natural History), London, United Kingdom.
BPBM	Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A.
DSIR	Department of Scientific and Industrial Research, Auckland, New Zealand.
EIHU	Entomological Institute, Hokkaido University, Sapporo, Japan.
FMNH	Field Museum of Natural History, Chicago, U.S.A.
ITZ	Instituut voor Taxonomische Zoölogie, Amsterdam, Netherlands.
MM	Moravské Museum, Brno, Czechoslovakia.
MNHN	Muséum National d'Histoire Naturelle, Paris, France.
NCSU	North Carolina State University, Raleigh, U.S.A.
NR	Naturhistoriska Riksmuseet, Stockholm, Sweden.
QM	Queensland Museum, Brisbane, Australia.
RNH	Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands.
SAM	The South Australian Museum, Adelaide, Australia.
UQ	University of Queensland, Brisbane, Australia.
USNM	[U.S. National Museum] National Museum of Natural History, Washington, D.C., U.S.A.
WADA	Department of Agriculture, Perth, Australia.
ZM	Zoologisk Museum, Copenhagen, Denmark.

Acknowledgements

My sincere thanks are due to the following people for the loan of material in their care: Dr M. Boulard, MNHN; Mr E. C. Dahms, QM; Dr L. L. Deitz, DSIR; Dr P. H. van Doesburg, RNH; Dr J. P. Duffels, ITZ; Dr G. F. Gross, SAM; Mr G. A. Holloway, AM; Dr J. P. Kramer, USNM; Dr P. Lauterer, MM; Dr Per Lindskog, NR; Dr G. B. Monteith, UQ; Dr G. M. Nishida, BPBM; Dr B. Petersen, ZM; Mr K. T. Richards, WADA; Dr R. T. Schuh, AMNH: Dr E. H. Smith, FMNH; Dr M. Suwa, EIHU; Dr D. A. Young, NCSU. I would also like to thank Dr U. Göllner-Scheiding for information on the types deposited in the Museum für Naturkunde der Humboldt-Universität, Berlin, D.D.R.

Remarks

The general absence of external distinguishing characters for species separation, and the fact that several species often occur in the same locality, make it impossible to associate males and females with confidence. For this reason the females have been omitted from the present study. Where associations have been made under 'Material examined' they are to be considered as tentative only.

BATRACOMORPHUS Lewis

Batracomorphus Lewis, 1834: 51. Type-species: *Batracomorphus irroratus* Lewis, by monotypy.
Eurinoscopus Kirkaldy, 1906: 346. Type-species: *Eurinoscopus lentiginosus* Kirkaldy, by original designation.
Ossana Distant, 1914: 518. Type-species: *Ossana bicolor* Distant, by original designation.

Acojassus Evans, 1972: 656. Type-species: *Acojassus montanus* Evans, by original designation. **Syn. n.**
Edijassus Evans, 1972: 656. Type-species: *Edijassus pallidus* Evans, by original designation. **Syn. n.**

Short, robust, wedge-shaped, slightly pubescent, length 3·50–9·25 mm. Colour stramineous, sometimes speckled with dark brown spots.

Head slightly narrower than pronotum, rarely equal to or wider than. Vertex short, transversely striate; length uniform, rarely slightly longer medially; anterior margin broadly rounded in dorsal aspect; slightly declivous in line with pronotum, continuously curved to face in lateral aspect or with dorsal area flattened. Face short, broad; maxillary plates wide, lateral margins sinuate. Lora widely separated from margin. Frontoclypeus broad, approximately circular in outline, laterofrontal sutures terminating just above antennal ledges. Clypellus distinct, short, broad, sides parallel. Antennae near posterior margin of eyes. Antennal ledges prominent, transverse or slightly oblique, extending onto frontoclypeus. Antennal pits deep. Ocelli distinct, near anterior margin of face, each approximately midway between midline and corresponding eye. Pronotum longer than vertex, slightly declivous anteriorly, increasing in width posteriorly, rarely parallel-sided; lateral margins long, strongly carinate; posterior margin shallowly concave; transversely striate. Scutellum long. Forewings long, exceeding abdomen, semi-coriaceous with appendix and first apical cell membranous, weakly punctate, rarely with small tubercles; appendix wide; vein separating appendix and first apical cell complete throughout its length; three subapical cells, closed basally. Setal formula of femora III: 2.2.1.

Male genitalia with pygophore longer than wide, emarginate dorsally to near midlength; lateral lobes broadly or narrowly rounded posteriorly, short spine-like setae over posterior half; posteriorly directed process medially on ventral margin, rarely absent. Tenth segment membranous. Valve small, fused to pygophore. Subgenital plates long, slender, triangular, extending to apex of pygophore, with short basal stem, the latter sometimes small or obscure; long hair-like setae usually arranged as a dorsolateral group at base, a short uniseriate row on dorsolateral margin and a multiseriate row on ventral margin extending also over medial surface of plate, the dorsolateral or ventral rows sometimes absent, plates sometimes densely setose. Eighth sternite longer than preceding ones and covering basal half of genital capsule. Styles with apical process elongate, terminating in a small dorsally directed hook and with a ventral subapical expansion sometimes present; lateral lobe well developed; basal arm very short. Connective Y-shaped, the arms linked to each other dorsally and ventrally by plate-like extensions; articulated to aedeagus. Aedeagus with shaft directed dorsally; gonopore usually long and extending over distal half of posterior margin of shaft, sometimes short; a longitudinal incision on anterior margin of shaft ('anterior incision') approximately same length as gonopore usually present; processes rarely present.

Morphology and species-groups

Batracomorphus has proliferated freely in both the Afrotropical and Oriental regions and over 300 species have been recorded from the Old World tropics, its centre of origin. Throughout its evolution the external facies of the group have remained remarkably constant and little affected by natural selection which has had its major effect upon the male genitalia. The variation shown by these structures, however, and the absence of any correlation between characters in this respect, precludes the demarcation of major species-groups of any evolutionary significance within the South East Asia Pacific area.

The most variable structures throughout the genus, of major importance for species recognition, are the pygophore processes. The simplest form in South East Asia and the Pacific is long and slender. Modification takes place either by the development of a subapical spur of varying shape and size (Figs 463, 546), culminating in forms with a bifid apex, or alternatively by the development of variously shaped lamellate expansions (Figs 178, 248, 308, 400). Reduction of the processes, culminating in their complete absence as in the type-species, is rare amongst Pacific species.

In contrast to the pygophore processes the styles and aedeagus are constant in shape in large numbers of species and are of more limited taxonomic value. In the majority of species the elongate apical process of the style increases in width towards its posterior end, narrowing subapically from the ventral margin to terminate in a dorsal medially curved finger-like apex (Fig. 5). The principal modification is the development of a lamellate expansion subapically on the ventral margin, usually small and triangular (Figs 122, 143) or in some cases spine-like and ventrally directed giving a bifid appearance to the apex (Figs 114, 134). Less frequent changes also occur in the more basal part of the process which is either abruptly narrowed distally,

creating a distinct apical neck (Figs 114, 191), or of uniform width throughout its length and sometimes strongly attenuated (Figs 116, 179, 185, 304).

The connective, referred to as Y-shaped, consists of a posterior shaft expanded anteriorly into an approximate hemisphere, the dorsal and ventral walls of which are shallowly or deeply concave from the anterior end. The relative length of the shaft, compared with the anterior arms, varies from long to short but is of limited taxonomic value.

The aedeagus shows little variation in the majority of species apart from slight differences in its relative width (Figs 6, 7, 193, 194) and the relative lengths of the gonopore and anterior incision. Modifications of the basic shape take several forms, each either unique as in *daedalus* or occurring in several closely related species as in *procne, chlorophana, evander* and *silvanus*. The shaft may be very slender and markedly recurved anteriorly (Fig. 328). The basal part of the aedeagus may be extended ventrally (Figs 222, 289) or enlarged in proportion to the shaft (Figs 741, 755) whilst the aedeagus as a whole may be shortened and robust with the reduction or loss of the basal apodeme (Figs 859, 897). The gonopore may be reduced in length and confined to the distal region of the shaft (Figs 181, 412, 846, 904) whilst the anterior incision may be likewise reduced and sometimes absent (Figs 182, 315, 412, 764, 791, 823, 894). Lateral lamellate expansions sometimes occur on the shaft, either apically or along its length (Figs 358, 363) and paired processes may be developed either basally (Fig. 417) or apically (Figs 784, 818, 884) on the shaft. Small tubercles sometimes occur on the lateral margin of the gonopore (Figs 269, 386).

Although major species-groups are absent, some species show sufficient similarity to others in one or more characters to indicate close relationships. Five such groups are recognisable, the characteristics of which are mentioned in the species descriptions under the first species in each group.

1. *pictus*-group (New Guinea, New Britain)
   pictus, theseus, cheesmanae, crossus
2. *procne*-group (Micronesia, Formosa, Philippines, Borneo, West Malaysia, Java, Sumatra, Samoa, Marquesas Islands, Burma, India, Sri Lanka, Africa)
   procne, chlorophana, evander, silvanus
3. *teucer*-group (Philippines, Borneo, West Malaysia)
   teucer, harpalyce, ascanius
4. *otus*-group (West Malaysia)
   otus, melampus, hector
5. *proserpine*-group (Borneo, West Malaysia, Sumatra)
   proserpine, coeus, thalia, triton

Like the external facies the subgenital plates, as illustrated in Figs 467 and 468, are one of the least variable characters within the genus. Modifications of the subgenital plates are relatively minor and occur in only a few species. They involve either the loss of the dorsal (Fig. 901) or ventral (Figs 719, 720) row of setae, with the occasional reduction or loss of the basal stem (Figs 739, 740, 901) in each group, or the development of a dense growth of long hair-like setae accompanied by the loss of the basal stem (Figs 921, 928, 936, 972). The 'reduction' or 'loss' of the stem appears to be due to the basal extension of the lateral lobe or the lateral expansion of the stem itself which is still visible in outline within the basal tissue of the plate. These modifications are correlated with variations in the styles, aedeagus and vertex and the species concerned may be grouped accordingly, the final groupings in each case being based on similarities in the aedeagus, styles and pygophore processes.

I. Subgenital plates without ventral setae; vertex flattened (except in *diomede*)
   A. Basal stem normal (New Guinea)
      1. *montanus, leda, viridinervis*
      2. *geryon*
   B. Basal stem reduced (Australia, New Guinea, New Britain, Borneo)
      1. *lavinia, sabinus, menelaus, othrys, pallas, zeus, diomede, samii*

C. Basal stem absent (Philippines, Borneo, New Guinea, Bismark Archipelago, Solomon Islands)
   1. *acestes, thetis, tityos, misenus, pustulatus, alceus, antenor, orithyia, tereus, ufens*
   2. *cycnus* (Philippines)

II. Subgenital plates without dorsal setae except for basal group; vertex flattened or rounded.
   A. Basal stem normal; vertex flattened
      1. *iulus, anchises, alcides, palinurus, vesta, janus, eumenides* (Java, West Malaysia, Borneo, Philippines, Sulawesi)
      2. *nereus, tullus, brooksi, ogasawarensis* (Australia, Philippines, Bonin Islands)
      3. *cyprian, adrastus, laodamia* (Philippines, Borneo)
   B. Basal stem reduced; vertex rounded
      1. *dymas, remus, lentiginosus* (New Guinea, Australia)

III. Subgenital plates densely pubescent, basal stem absent; vertex flattened (except in *briseis*) (New Guinea, New Britain)
      1. *thestor, leto*
      2. *boschmai, semele, nitens, hermes, xanthus, briseis, artemis, iris*
      3. *telamon, enyo*

All modifications of the genitalia are clearly derived from the more primitive condition prevailing in the majority of species. The heterogeneous nature of each of the three principal groups outlined above, however, suggests that the loss of setae and basal stem or the acquisition of a dense pubescence has occurred independently on several different occasions and that the groups themselves have little or no evolutionary significance. This is particularly so in the third group which shows differences between the subgroups in the distribution pattern of the setae themselves.

Biology

The species of *Batracomorphus* are mainly arboreal although some also occur on shrubs, herbaceous plants and grasses. The host-plant data given for the African species by Linnavuori & Quartau (1975) and Quartau (1981*b*) are limited mainly to forest types rather than specific host-plants. The latter are listed for 10 species by Quartau (1981*a*) indicating a preference for *Acacia* (Leguminosae) with other hosts in the families Combretaceae, Anacardiaceae and Compositae. No species of the genus or the subfamily have been associated with virus or disease transmission.

The biology of the South East Asia Pacific species is unknown apart from isolated records of host-plants for a few species which do not reveal any significant pattern. These records, together with the data available from present material, are listed below.

Species	Host-plant	Family*	Location	Reference
adventitiosus	*Casuarina* sp.	Casuarinaceae	New Hebrides	**
adventitiosus	*Coprosma parviflora*	Rubiaceae	New Zealand	Knight (1974)
adventitiosus	*C. robusta*	Rubiaceae	New Zealand	Knight (1974)
adventitiosus	*Hoheria glabrata*	Malvaceae	New Zealand	Knight (1974)
adventitiosus	*Juncus* sp.	Juncaceae	New Zealand	Knight (1974)
adventitiosus	*Leptospermum ericoides*	Myrtaceae	New Zealand	Knight (1974)
adventitiosus	*L. scoparium*	Myrtaceae	New Zealand	Knight (1974)
adventitiosus	*Muehlenbeckia* sp.	Polygonaceae	New Zealand	Knight (1974)
adventitiosus	*Nothofagus solandri*	Fagaceae	New Zealand	Knight (1974)
adventitiosus	*Plagianthus betulinus*	Malvaceae	New Zealand	Knight (1974)
adventitiosus	*P. divaricatus*	Malvaceae	New Zealand	Knight (1974)

* Compiled from *A Dictionary of the Flowering Plants and Ferns* (8th edition) by J. C. Willis. Revised by H. K. Airy Shaw. Cambridge University Press. 1973.
** New host-plant records.

Species	Host-plant	Family*	Location	Reference
adventitiosus	*Polystichum aculeatum*	Aspidiaceae	New Zealand	**
angustatus	*Cassinia leptophylla*	Compositae	New Zealand	Knight (1974)
angustatus	*C. vauvilliersii*	Compositae	New Zealand	Knight (1974)
angustatus	*Colocasia esculenta*	Araceae	Niue Is.	Eyles & Linnavouri (1974)
angustatus	*Crotalaria* sp.	Leguminosae	Niue Is.	Eyles & Linnavuori (1974)
angustatus	*Cytisus* sp.	Leguminosae	New Zealand	Knight (1974)
angustatus	*Erigeron* sp.	Compositae	New Zealand	Knight (1974)
angustatus	*Kumara* sp. (= *Aloë*)	Liliaceae	Niue Is.	Eyles & Linnavuori (1974)
atrifrons	*Morinda* sp.	Rubiaceae	S. Mariana Is.	Linnavuori (1960*a*)
atrifrons	*Pandanus* sp.	Pandanaceae	S. Mariana Is.	Linnavuori (1960*a*)
collinus	*Cheirodendron* sp.	Araliaceae	Marquesas Is.	**
collinus	*Cyathea* sp.	Cyatheaceae	Marquesas Is.	**
collinus	*Cyrtandra* sp.	Gesneriaceae	Marquesas Is.	Osborn (1934*b*)
collinus	*Metrosideros collina*	Myrtaceae	Marquesas Is.	Osborn (1934*b*)
collinus	*Vaccinium* sp.	Ericaceae	Marquesas Is.	Osborn (1934*b*)
collinus	*Weinmannia parviflora*	Cunoniaceae	Marquesas Is.	**
collinus	*Wickstroemia foetida*	Theaceae	Marquesas Is.	**
cybele	*Commersonia* sp.	Sterculiaceae	Solomon Is.	**
cybele	*Pipturus* sp.	Urticaceae	Solomon Is.	**
maculatus	*Metrosideros collina*	Myrtaceae	Marquesas Is.	Osborn (1934*b*)
maculatus	*Rapanea* sp.	Myrsinaceae	Marquesas Is.	**
maculatus	*Weinmannia parviflora*	Cunoniaceae	Marquesas Is.	**
sarpedon	*Acacia decurrens*	Leguminosae	Australia	**
sarpedon	*Hakea sericea*	Proteaceae	Australia	**
sarpedon	*Pultenaea villosa*	Leguminosae	Australia	**
viridoflavidus	*Piper guahamense*	Piperaceae	Guam	Linnavuori (1960*a*)

* Compiled from *A Dictionary of the Flowering Plants and Ferns* (8th edition) by J. C. Willis. Revised by H. K. Airy Shaw. Cambridge University Press. 1973.
** New host-plant records.

Most species occur in lowland forests, below 1200 m, although *bacchusi, ganymede, agenor* and *leto* in New Guinea and *angustatus, cloelia, silvanus* and *orestes* in the Philippines extend to 1600 m and sometimes higher. The species *ares, elissa, numa, eriphyle, montanus, leda* and *thestor* in New Guinea and *priam* in the Philippines are recorded only from the higher altitudes between 1600 m and 2745 m.

Certain localities are capable of supporting very large numbers of species, Damanti in the Finisterre Mountains of Papua New Guinea, Quoin Hill near Tawau in SE Sabah and the junction of the rivers Tinjar and Lejok at the foot of Mount Dulit in Sarawak, having 24, 33 and 13 species of *Batracomorphus* respectively. Whether these large numbers are due to strong host-plant specificity or the attractiveness of particular food plants is unknown. The answer to these and other biological questions within the genus will require intense and prolonged studies at selected sites of high species density. *Batracomorphus* species come readily to light and the bulk of the available material has been collected in this way. This technique, whilst highly productive of specimens, provides little information on biology other than general habitat. More precise techniques, such as canopy sampling from aerial walkways and tree-fogging for example, are required to determine the true insect-plant relationships in this genus as well as elsewhere within the Cicadellidae.

Distribution

Batracomorphus is a genus of several hundred species and occurs in all geographical regions with the exception of the New World. Its major expansion has taken place in the tropics and Linnavuori & Quartau (1975) and Quartau (1981*b*) have already described 121 species from the Afrotropical region.

The present study is concerned with the fauna of Malaysia (including West Malaysia), Brunei, Indonesia, Philippines, Micronesia, Papua New Guinea, Solomon Islands, New Hebrides, New Caledonia, Australia, New Zealand, Fiji, Samoa and the various Pacific Trust Territories of Polynesia. The area conforms approximately with the eastern Oriental and Australian regions of Gressitt (1961) with the exception of the Indo-Chinese and northern Malayan subregions and the Hawaiian division. The study area, which extends to approximately latitude 20° north, excludes the whole of continental Asia except for West Malaysia.

Records for the mainland fauna of the Iassinae (Metcalfe, 1966) are limited to one species in Burma and 12 species in China, including Formosa, of which only one, *indicus*, has been recorded for the Pacific proper. Of the remaining species, four belong to genera other than *Batracomorphus*, four are nomina dubia and three are restricted to the Indo-Chinese subregion. The lack of material precludes the extension of the present study beyond its defined limits although the genus is currently under study in the Indian subcontinent by Dr C. A. Viraktamath. The genus does not occur in the Hawaiian division.

The strong morphological similarity between the Pacific species, with the exception of the male genitalia, and the absence of biological data, impedes any significant zoogeographical study of the Pacific fauna which would at best be tenuous and inconclusive. Also, the ability of the forests to support large numbers of species and the inadequacy of surveys made so far suggest that there are many more species to be discovered and that any conclusions made at the present time on faunal links in the Pacific area would be subject to continual revision in the light of new discoveries. Nevertheless, it is of value to draw attention to the few faunal patterns and island relationships that are apparent as a basis for further study.

The majority of the South East Asian Pacific species occur in the western part of the area and decrease dramatically further east, away from the source area. The Philippines, Borneo and New Guinea contain 40, 48 and 60 species respectively compared with the Solomon Islands which have five and the New Hebrides and New Caledonia which have six and four respectively. The decrease is even more marked further out in the Pacific where most of the islands or island groups contain only one or two species. Irregularities in this general pattern occur in Sumatra, Java, Sulawesi and the Lesser Sunda Islands each with very few recorded species, mainly due to inadequate sampling. Likewise, most of the major islands have been only partially surveyed and will themselves yield many more species which undoubtedly will substantiate rather than change the overall picture which has already emerged. The number of species in Australia (18) is similar to that in New Britain (17) despite its much greater land mass, due partly to its more arid and more temperate climate and partly to its more recent contact with the centre of origin of the genus.

Of the 188 species recorded from the South East Asia Pacific area in the present paper, 148 or 78 per cent are endemic. Endemism is higher in New Guinea and Australia, 85 per cent and 72 per cent respectively, than in Borneo (54 per cent) and the Philippines (57 per cent) both of which were once united to the mainland. West Malaysia itself has 20 species of which only 45 per cent are endemic. Sumatra and Java, also part of the Continental Shelf, share most or all of their species with West Malaysia and Borneo. The Lesser Sunda Islands are the eastern limits for the widespread mainland species *indicus*. Of the 39 non-endemic species, half are restricted to islands on or immediately north of the Sunda Shelf reflecting yet again the earlier connections between these land areas. Those species extending northwards into the Philippines are of particular interest as evidence of the two apparent routes followed during colonisation of these islands from the south, one through Palawan and the other on the opposite side of the Sulu Sea through Tawi Tawi and Mindanao. The early stages are shown by *itys, cocles* and *laodamia* which extend only into Palawan and by *chlorophana* which extends into both Palawan and Tawi Tawi. Further progress along the eastern route is demonstrated by *ascanius* and *hesperides*, which occur in Palawan and Mindanao, and by *ilia, anchises, juno* and *procne* which extend along the western arm as far as Busuanga Island and on the east through Tawi Tawi and Mindanao to as far as Negros or Luzon. A similar two-pronged migration has doubtless accounted for the present distribution of *teucer* and *ilioneus* which outside West Malaysia and Borneo are currently found only in Palawan, Negros and Luzon. Additional evidence of the

close relationship between West Malaysia, the islands of the Sunda Shelf and the Philippines is provided by the *teucer*-group, *proserpine*-group, *iulus*-group and *cyprian*-group all of which are confined to this area.

In contrast, Sulawesi, as an indication perhaps of its previous geographical isolation, has three of its four species unique to the island although one of these belongs to the *iulus*-group which is widespread on the Shelf. Wallace's Line, between the Sunda Shelf and Sulawesi, has been an effective barrier to eastwards migration, all species on the Shelf appearing to stop short at its eastern edge. The only non-endemic species on Sulawesi is *camillus* which is restricted to the eastern extremity of Minahassa province. Its wide distribution throughout the Philippines suggests a link between the two areas along the Kepulauan Archipelago.

New Guinea is the second largest island, after Australia, in the South East Asia Pacific area and lies on the main colonisation route between the west and Melanesia. Its strongest links in the present genus are with New Britain with which it shares a number of species. Species are also shared with Borneo (*zeus*), Ambon (*virbius*) and Australia (*lentiginosus*) whilst the widespread species *orestes* extends from the Philippines through Ceram, New Guinea, Australia, New Britain and Samoa. Of the several species-groups present in New Guinea, the *lavinia*-group extends to Borneo, Australia and New Britain and the *acestes*-group to the Philippines, Borneo, Bismark Archipelago and the Solomon Islands.

East of New Guinea the islands of the Melanesian Arcs have a very depauperate fauna composed of widespread species and endemics, the relationships of the latter being confined to adjacent islands within the Arcs. The New Hebrides and New Caledonia each share a species with Australia.

Apart from Guam and Fiji, which each have one endemic species, the smaller islands of the Pacific itself have been colonised by widespread species either from the west, such as *silvanus, curvatus* and *harpago* in Micronesia and *angustatus* and *orestes* in Polynesia, suggesting recent colonisation, or by species exclusive to the Pacific, such as *viridoflavidus* in Micronesia. Further out in the Pacific, in the Bonin Islands and Marquesas Islands, the fauna, although depauperate, is endemic. The single Bonin Island species belongs to the *nereus*-group which extends through the Philippines to Australia whilst the two Marquesas Island species differ sufficiently from normal to suggest a colonisation date much earlier than that for the rest of Polynesia. The external characters found in the Marquesas Island species occur also in the single endemic species in Christmas Island in the Indian Ocean although the fact that these are derived from the more widespread primitive form suggests that the two faunas are convergent rather than related relicts.

A link between the Indian sub-continent and the SW. Pacific is demonstrated by the species *chlorophana* which occurs in Sri Lanka, West Malaysia, Java, Borneo and the Philippines. The presence of a second Indian species, *indicus*, previously recorded from Sri Lanka, Seychelles, Burma, China and the Lesser Sunda Islands, was not confirmed and the earlier record from the Pacific area may have been a misidentification. Although no species are shared between the Pacific and the Afrotropical region, the Pacific species *curvatus* is unique in having male genitalia similar to those of African species. It is very likely that the relationship between the faunas of these once united regions will become more apparent when the Indian and mainland Asian species are better known.

Techniques and methods

The techniques used in the handling of specimens are as given by Knight (1965) who also illustrates the parts of the male genitalia used for species identification.

In the following descriptions all species, unless otherwise indicated, are stramineous in colour and have the head narrower than the pronotum with the vertex of uniform length and sloping gently towards a broadly rounded anterior margin. Further, all species up to and including *triton* (p. 158) have the subgenital plates normal in shape, as in *harpago*, except as indicated for *maculatus* (p. 56), *adventitiosus* (p. 60), *anubis* (p. 80) and *pictus* (p. 97).

For purposes of uniformity and ease of species comparison the following structures and aspects are shown for each species: aedeagus, left lateral view (e.g. Fig. 1); aedeagus, posterior

view (e.g. Fig. 2); left pygophore lobe and process, left lateral view (e.g. Fig. 4); left style, left lateral view (e.g. Fig. 5). Additional views of the pygophore processes are sometimes given where necessary, the particular view being indicated in the appropriate caption. The illustration of the pygophore of *protesilaus* (Figs 374, 375, 376) is of the right-hand lobe, the left one having been damaged in the material available. The subgenital plates are illustrated for *anubis* (Figs 186, 187), *harpago* (Figs 467, 468), *montanus* (Figs 719, 720), *acestes* (Figs 739, 740), *lavinia* (Figs 788, 789), *zeus* (Figs 816, 817), *dymas* (Fig. 901), *thestor* (Figs 916, 917), *leto* (Figs 921, 922), *boschmai* (Figs 928, 929), *semele* (Figs 935, 936) and *telamon* (Figs 972, 973). The pygophore, aedeagus and styles for each species are drawn to different scales, whilst each structure also varies slightly in scale between species.

The species descriptions are arranged mainly in accordance with the increasing modification of the pygophore processes (see p. 31) and subgenital plates (see p. 32).

The data for primary types are cited in full. For all other specimens the island only is cited, except for Borneo and New Guinea for which the country in question is also given. The names of the collectors are as follows: Adamson, A. M.; Alston, A. H. G.; Alton, A.; Andrews, C. W.; Ashby, A. P.; Atherton, D. O.; Bacchus, M. E.; Baker, C. F.; Bradley, J. D.; Brandt, W. W.; Brass, L. J.; Britton, E. B.; Le Bronnec, ?; Brooks, C. J.; Broomfield, P. S.; Bryan, E. H.; Buxton, P. A.; Celestino, M.; Cheesman, L. E.; Clarke, J. F. G.; Cochereau, P. M.; Conwell, L. A.; Corbett, G. H.; Dybas, H. S.; Ford, E. J., Jr; Gee, G. F.; Graham, O. H.; Grant, J. A.; Greening, H. G.; Greenslade, P.; Gressitt, J. L.; Gressitt, L.; Gressitt, M.; Gross, G. F.; Hardy, D. H.; Harris, T. R.; Henderson, M. R.; Heyneman, D.; Hill, F. L.; Hirashima, Y.; Hobby, B. M.; Hocking, B.; Holtman, H.; Hoogstraal, H.; Hopkins, G. H.; Howes, G.; Jackson, J. B.; Jacobson, E.: Joyce, C. R.; Kellers, H. C.; Knapp, V. R.; Knight, K. L.; Knight, W. J.; Koebele, A.; Krauss, N. L. H.; Krombein, K. V.; Kuncheria, K. J.; Lea, A. M.; Lever, R. A.; Maa, T. C.; MacGillavry, D.; Maddison, P. A.; Malkin, B.; Matsumura, S.; Mjöberg, E.; Miller, N. C. E.; Milliron, H. E.; Moore, A. W.; Muir, F.; Mumford, ?; Myers, J. G.; Nikitin, M. I.; O'Brien, C. W.; Oman, P.; Pemberton, C. E.; Pendlebury, H. M.; Perkins, R. C. L.; Piper, C. V.; Quate, L. W.; Quate, S.; Ray, E.; Reyes, A.; Richards, K. T.; Rio, G.; Robinson, G. S.; Schneirla, T.; Sedlacek, J.; Sedlacek, M.; Seimund, E.; Shanahan, P.; Smart, J.; Spencer, N. R.; Stangl, P. L.; Straatman, R.; Stüber, W.; Swezey, O. H.; Tauraa, H.; Tawi, ?; Thompson, M.; Tindale, N.; Tonnoir, A.; Torrevillas, H. M.; Torrevillas, W.; Turner, R. E.; Uzel, H.; Vecht, J. v. d.; Wager, A. M. R.; Weir, T.; Werner, F. G.; Winkler, J.; Yoshimoto, C. M.; Zwaluwenburg, R. H. Van.

Key to eastern Oriental and Australian species of *Batracomorphus* (males only)

1	Subgenital plates densely setose ventrally (Figs 917, 921, 928, 936, 972); basal stem and lobe indistinct	182
–	Subgenital plates sparsely or non-setose ventrally (Figs 186, 468, 719, 740, 788, 816, 901); basal stem and lobe usually pronounced, sometimes indistinct	2
2(1)	Subgenital plates with a row of hair-like setae on both dorsal and ventral margin (Fig. 468)	3
–	Subgenital plates with row of hair-like setae absent from either ventral margin (Figs 719, 740, 788, 816), dorsal margin except for basal group (Fig. 901), or both (Fig. 874)	142
3(2)	Aedeagus of basic type (Figs 6, 7), socle sometimes produced ventrally (Figs 222, 294), shaft sometimes elongate (Fig. 328), without processes or lamellate expansions	4
–	Aedeagus with processes or lamellate expansions (Figs 315, 363), the latter sometimes small and apical (Figs 218, 343, 348)	114
4(3)	Aedeagus with minute tubercles distally on posterior margin of shaft (Figs 370, 390)	138
–	Aedeagus without minute tubercles on posterior margin of shaft	5
5(4)	Apical process of styles without subapical expansion on ventral margin (Fig. 5), sometimes acuminate and weakly serrate (Figs 615, 680)	6
–	Apical process of styles with triangular (Fig. 571) or keel-like expansion (Fig. 292) or thorn-like projection (Fig. 529) subapically on ventral margin, sometimes small (Figs 254, 257, 337)	62

6(5) Pygophore processes small, membranous, sometimes indistinct (Figs 16, 21) 7
– Pygophore processes large, sclerotised, variously shaped, distinct (Figs 4, 638) 8
7(6) Forewings stramineous, rarely speckled with small dark brown spots; pygophore processes finger-like, acute, distinct; apical process of style enlarged distally but not bulbous. Marquesas Islands ..... ***collinus*** (Osborn) (p. 53)
– Forewings stramineous with dark brown transverse bands usually present; pygophore processes short, truncate, indistinct; apical process of style strongly expanded and bulbous distally. Marquesas Islands ..... ***maculatus*** (Osborn) (p. 53)
8(6) Aedeagus with socle strongly produced ventrally, approximately equal in length to shaft (Figs 222, 299); apical process of style elongate, slender (Figs 227, 304) 9
– Aedeagus with socle not produced ventrally (Fig. 86), if equal in length to shaft then apical process of style expanded over distal half (Fig. 5) 10
9(8) Aedeagus with shaft recurved anteriorly; pygophore processes slender, strongly arched, apex acute; apical process of style directed posteriorly; colour stramineous or brown, forewings paler with narrow transverse brown band at midlength. Philippines, Palau, Borneo, Java ..... ***curvatus*** Linnavuori (p. 86)
– Aedeagus with shaft directed dorsally; pygophore processes slender, directed posteriorly, apex expanded; apical process of style directed posteriorly with distal one-fourth to one-third turned abruptly dorsad; colour stramineous, pronotum, scutellum and forewings speckled with dark brown spots. New Guinea, New Britain ***cheesmanae*** sp. n. (p. 99)
10(8) Aedeagus with shaft elongate, slender, strongly recurved (Figs 318, 328) 11
– Aedeagus with shaft short, robust, directed dorsally, sometimes curving anterodorsally but not strongly recurved (Figs 6, 58) 12
11(10) Shaft of aedeagus directed dorsoposteriorly over basal half, recurved at midlength; ventral margin of socle extending ventrad of basal articulation of aedeagus. Philippines, Borneo, West Malaysia, Java, Sumatra ..... ***procne*** sp. n. (p. 102)
– Shaft of aedeagus directed posteriorly at base, recurved basad of midlength; ventral margin of socle not extending ventrad of basal articulation of aedeagus. Philippines, Borneo, West Malaysia, Java ..... ***chlorophana*** (Melichar) (p. 103)
12(10) Pygophore processes slender, without subapical expansions or processes (Figs 4, 30, 205) 13
– Pygophore processes slender or robust, with subapical process or expansion (Figs 463, 668, 248), the latter sometimes minute and represented only by acute ridge (Figs 214, 196, 167) 28
13(12) Apical process of style bulbous over distal half (Figs 89, 92) 14
– Apical process of style of uniform width or only slightly wider over distal half, never bulbous (Figs 5, 71) 15
14(13) Pygophore processes filiform, directed posteriorly and curving dorsally; apical process of style with small group of 'teeth' on ventral margin near midlength. Australia ***palicus*** sp. n. (p. 65)
– Pygophore processes slender but not filiform, directed posteriorly and markedly sinuate at midlength; apical process of style without group of 'teeth'. Fiji ***hamadryas*** (Kirkaldy) (p. 65)
15(13) Pygophore processes directed posteriorly, straight or sinuate (Figs 4, 239), apex sometimes turned mesad or laterad (Figs 31, 97) 19
– Pygophore processes directed posteriorly, curving dorsally (Figs 77, 85, 102) 16
16(15) Pygophore processes filiform, extending to posterior half of pygophore lobe (Figs 77, 85) 17
– Pygophore processes robust, extending only to midlength of pygophore lobe (Fig. 102). New Hebrides ..... ***manlius*** sp. n. (p. 66)
17(16) Colour stramineous; pygophore processes reaching to or near posterior margin of pygophore lobe (Figs 72, 85) 18
– Colour stramineous with dark brown spots on forewings; pygophore processes shorter, not reaching to near posterior margin of pygophore lobe (Fig. 77). Australia ***sarpedon*** sp. n. (p. 62)
18(17) Pygophore processes annulate apically; apical process of style of uniform width. Australia ..... ***hecate*** sp. n. (p. 65)
– Pygophore processes not annulate apically; apical process of style expanded over distal half. Philippines, Borneo ..... ***ilia*** sp. n. (p. 62)

19(15) Pygophore processes internally convolute subapically (Figs 205, 206). Philippines ***cloelia*** sp. n. (p. 83)
– Pygophore processes not convoluted subapically 20
20(19) Pygophore processes with apex directed posteriorly (Figs 3, 97) 23
– Pygophore processes with apex turned mesally (Figs 31, 55) 21
21(20) Aedeagus with socle relatively large, its dorsoventral length approximately two-thirds or more length of shaft; gonopore and anterior incision of approximately equal length (Figs 28, 53) 22
– Aedeagus with socle much smaller, its dorsoventral length approximately one-third length of shaft; gonopore much longer than anterior incision (Fig. 33). Philippines ***pentheus*** sp. n. (p. 56)
22(21) Pygophore processes turned abruptly mesad subapically; aedeagus with shaft turned only slightly anteriorly from midlength; apical process of style abruptly narrowed subapically. Borneo ..... ***charis*** sp. n. (p. 56)
– Pygophore processes turned gradually mesad subapically; aedeagus with shaft turned strongly anteriorly from midlength; apical process of style gradually narrowed to apex. Australia, New Hebrides, New Zealand ..... ***adventitiosus*** Evans (p. 60)
23(20) Length 3·75–5·00 mm; pygophore processes elongate, slender, not filamentous (Figs 4, 96, 239) 24
– Length 5·60–6·00 mm; pygophore processes filamentous (Fig. 449). New Hebrides ***cronos*** sp. n. (p. 121)
24(23) Pygophore processes turned abruptly mesad just before midlength, then posteriorly (Fig. 97). Australia ..... ***latona*** sp. n. (p. 66)
– Pygophore processes straight or sinuate but not turned abruptly mesad along its length (Figs 3, 239) 25
25(24) Pygophore processes sinuate in lateral aspect (Fig. 239). Solomon Islands ***tydeus*** sp. n. (p. 89)
– Pygophore processes straight in lateral aspect (Fig. 4) 26
26(25) Aedeagus with socle relatively large, its dorsoventral length approximately equal to length of shaft (Fig. 1). Widespread ..... ***angustatus*** (Osborn) (p. 51)
– Aedeagus with socle smaller, its dorsoventral length much shorter than length of shaft (Figs 6, 11) 27
27(26) Colour stramineous, face dark brown medially; pygophore processes straight. S. Mariana Islands ..... ***atrifrons*** (Metcalf) (p. 51)
– Colour stramineous, dorsum speckled with small dark brown spots; pygophore processes relatively shorter, slightly arched. Philippines ..... ***charybdis*** sp. n. (p. 53)
28(12) Pygophore processes with apex bifid (Fig. 643) or with distinct subapical spur (Fig. 463), the latter sometimes small (Figs 201, 458) 39
– Pygophore processes with apex expanded (Figs 248, 280) or with medial, ventral or lateral margin acuminate and keel-like subapically (Figs 167, 275), sometimes only slightly so (Figs 40, 210, 214 29
29(28) Pygophore processes expanded apically, subapical margin acuminate or not (Figs 248, 280) 30
– Pygophore processes not expanded apically, medial, ventral or lateral margin acuminate and keel-like subapically (Figs 166, 243, 275) 32
30(29) Aedeagus with base of shaft obliquely rounded to socle (Figs 245, 311); pygophore processes strongly expanded apically (Figs 248, 313) 31
– Aedeagus with base of shaft abruptly rounded to socle (Fig. 277); pygophore processes only slightly expanded apically (Fig. 280). Borneo ..... ***juturna*** sp. n. (p. 95)
31(30) Pygophore processes directed posteriorly and expanded plate-like subapically; apical process of style abruptly narrowed subapically; aedeagus with shaft of approximately uniform width in lateral aspect. Australia ..... ***elegans*** (Evans) (p. 99)
– Pygophore processes directed posteriorly at base and turned abruptly mesad at midlength, distal half expanded claw-like; apical process of style gradually narrowed to apex; aedeagus with shaft tapered to acute apex. New Guinea ..... ***ganymede*** sp. n. (p. 90)
32(29) Aedeagus with gonopore and anterior incision of approximately equal length (Figs 164, 273) 33
– Aedeagus with anterior incision approximately two-thirds length of gonopore (Fig. 39). Philippines ..... ***briareus*** sp. n. (p. 56)

33(32) Colour stramineous, without dark brown spots 35
– Colour stramineous, with dark brown spots on forewings and sometimes pronotum 34
34(33) Pygophore processes with subapical acuminate margin non-serrate; aedeagus with gonopore and anterior incision extending to near base of shaft; pronotum and forewings speckled with very small dark brown spots; length 5·25 mm. Philippines
priam sp. n. (p. 83)
– Pygophore processes with subapical acuminate margin serrate; aedeagus with gonopore and anterior incision extending to midlength of shaft; pronotum stramineous, forewings speckled with small variably sized dark brown spots; length 4·00–4·50 mm. Solomon Islands ..... ***cybele*** sp. n. (p. 78)
35(33) Pygophore processes with distal third turned abruptly dorsad (Fig. 275). West Malaysia
tithonus sp. n. (p. 95)
– Pygophore processes with distal third not turned dorsad (Figs 195, 214)..... 36
36(35) Pygophore processes directed posteriorly, slightly sinuate (Fig. 195). Philippines
torrevillasi sp. n. (p. 82)
– Pygophore processes directed dorsoposteriorly over basal half then turned posteriorly or ventroposteriorly (Figs 214, 285) 37
37(36) Pygophore processes with extreme apex turned abruptly at angle to distal half of process (Fig. 243). New Guinea ..... ***proteus*** sp. n. (p. 90)
– Pygophore processes with apex not so turned (Figs 214, 285) 38
38(37) Pygophore processes sinuate in ventral aspect, distal half turned posteroventrally in lateral aspect. Australia..... ***icarus*** sp. n. (p. 85)
– Pygophore processes straight in ventral aspect, distal half turned posteriorly in lateral aspect. Micronesia ..... ***viridoflavidus*** (Metcalf) (p. 95)
39(28) Pygophore lobes strongly produced posteriorly, their dorsal margins level with and in line with dorsal margin of base, their apex acutely rounded (Fig. 661). New Guinea
notulatus Blöte (p. 151)
– Pygophore lobes not strongly produced posteriorly, their dorsal margin ventrad of and at angle to dorsal margin of base, their apex broadly rounded (Figs 463, 622) 40
40(39) Pygophore processes bifid at extreme apex, the two branches very short, of approximately equal length, each not or only slightly longer than wide (Figs 51, 62, 67) 41
– Pygophore processes with bifurcation or spur more basad, the two branches of markedly different or similar length, one or both considerably longer than wide (Figs 463, 623, 458) 43
41(40) Aedeagus with gonopore and anterior incision extending to midlength of shaft, the latter slender and tapering markedly to finger-like apex in lateral aspect (Fig. 48); pygophore processes sinuate in ventral aspect (Fig. 51). Philippines .. ***inachus*** sp. n. (p. 59)
– Aedeagus with gonopore and anterior incision extending basad of midlength of shaft, the latter more robust and less tapered distally (Figs 58, 64); pygophore processes curving mesad in ventral aspect but not sinuate (Figs 62, 67) 42
42(41) Aedeagus with shaft of uniform width in lateral aspect; pygophore processes directed posteriorly or dorsoposteriorly and curving medially. Australia, New Caledonia
dryas (Kirkaldy) (p. 60)
– Aedeagus with shaft much wider basally than distally in lateral aspect; pygophore processes directed posteriorly and curving ventrally. Philippines ..... ***ancus*** sp. n. (p. 60)
43(40) Pygophore processes filamentous (Fig. 449), with small subapical spur on ventral margin approximately one-fourth distance from apex; length 5·5–6·0 mm. New Hebrides
cronos sp. n. (p. 121)
– Pygophore processes not filamentous (Figs 498, 643), if so then length less than 5·0 mm 44
44(43) Pygophore processes with small triangular spur subapically on lateral margin, approximately as long as wide (Figs 201, 458, 614) 45
– Pygophore processes with subapical spur on ventral margin, triangular or elongate (Figs 498, 643), if on lateral margin then always much longer than wide (Figs 623, 629)..... 47
45(44) Pygophore processes directed posteriorly, sometimes curving mesally (Figs 458, 460)..... 46
– Pygophore processes directed posteriorly, sinuate at mid-length with apex turned laterally (Figs 200, 201). New Guinea..... ***memnon*** sp. n. (p. 83)
46(45) Pygophore processes strongly curved mesad; length 5·00–5·25 mm. Philippines
hera sp. n. (p. 144)

– Pygophore processes directed posteriorly or weakly curved mesad; length 3·50–3·75 mm. New Caledonia ..... ***acrisius*** sp. n. (p. 121)

47(44) Aedeagus with anterior incision markedly shorter than gonopore (Figs 493, 504) 48

– Aedeagus with anterior incision equal to or longer than gonopore (Figs 461, 635) 49

48(47) Head narrower than pronotum; eyes normal. Philippines, Borneo, West Malaysia ***juno*** sp. n. (p. 125)

– Head equal to or wider than pronotum; eyes prominent. Christmas Island (Indian Ocean) ..... ***punctatus*** (Kirby) (p. 127)

49(47) Stramineous or light brown 53

– Stramineous or brown, with dark brown spots or bands 50

50(49) Pygophore processes with upper branch of apical bifurcation acute (Fig. 595) 51

– Pygophore processes with upper branch of apical bifurcation bifid (Figs 643, 652) 52

51(50) Pygophore processes sinuate at midlength, the upper branch of apical bifurcation expanded subapically; aedeagus with shaft tapering throughout its length in lateral aspect to finger-like apex. New Guinea ..... ***nabirensis*** Evans (p. 141)

– Pygophore processes straight with distal third turned dorsad, the upper branch of apical bifurcation not expanded subapically; aedeagus with shaft of uniform width in lateral aspect to near apex. New Guinea ..... ***agenor*** sp. n. (p. 142)

52(50) Pygophore processes with branches of apical bifurcation of approximately equal length; pronotum and scutellum speckled with small dark brown spots; forewings with apex, patch on claval commissure and another at anterior end of appendix dark brown. New Guinea ..... ***molus*** sp. n. (p. 148)

– Pygophore processes with upper branch of apical bifurcation much shorter than lower; pronotum and scutellum without dark brown spots; forewings speckled with small dark brown spots. New Guinea ..... ***eriphyle*** sp. n. (p. 150)

53(49) Pygophore processes with both branches of apical bifurcation expanded (Figs 639, 648) 54

– Pygophore processes with one or both branches of apical bifurcation acute (Figs 608, 623, 674) 55

54(53) Pygophore processes straight, directed posteriorly, both branches of apical bifurcation short and weakly bifid. New Guinea ..... ***pyrrhus*** sp. n. (p. 150)

– Pygophore processes directed posteriorly and turned dorsad at midlength, both branches of apical bifurcation rounded distally and with small spurs. Philippines ***dido*** sp. n. (p. 148)

55(53) Pygophore processes with subapical spur short, triangular, directed ventrally at right angles to axis of process (Figs 463, 608, 619) 56

– Pygophore processes with subapical spur elongate and sometimes equal in length to upper branch, directed posteriorly in line with axis of process or laterally (Figs 623, 668, 681) 58

56(55) Pygophore processes directed posteriorly and turned dorsoposteriorly at midlength basad of subapical spur (Fig. 619). New Britain ..... ***dardanus*** sp. n. (p. 144)

– Pygophore processes directed posteriorly, straight or with apex turned only slightly dorsad at level of subapical spur (Figs 463, 608) 57

57(56) Pygophore processes slender apically, ventral margin between subapical spur and apex not or only slightly serrate. Kusaie, New Ireland, New Britain, Solomon Islands, New Hebrides ..... ***harpago*** Linnavuori (p. 122)

– Pygophore processes robust apically, ventral margin between subapical spur and apex strongly serrate. New Guinea ..... ***ceres*** sp. n. (p. 144)

58(55) Pygophore processes with subapical spur or branch directed laterally (Figs 622, 623) 59

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– Pygophore processes turned dorsad at midlength or more basally (Figs 766, 771) 159
159(158) Pygophore processes turned dorsad near base (Fig. 766); aedeagus with shaft strongly recurved and directed anteriorly (Fig. 763). New Britain ..... ***antenor*** sp. n. (p. 167)
– Pygophore processes turned dorsad at midlength (Fig. 771); aedeagus with shaft less recurved and directed anterodorsally (Fig. 768). New Guinea ..... ***orithyia*** sp. n. (p. 167)
160(143) Aedeagus with processes bifid, shaft laterally compressed with posterior margin acuminate medially over basal half (Figs. 795, 799). New Guinea ..... ***menelaus*** sp. n. (p. 172)
– Aedeagus with processes not bifid or if so then shaft elongate and slender (Fig. 810) 161
161(160) Aedeagus with processes directed dorsally (Figs. 783, 790) 162
– Aedeagus with processes directed ventrally or posteroventrally (Figs 810, 818) 163
162(161) Aedeagus with shaft elongate, 4–5 times length of basal apodeme (Fig. 790). New Guinea ..... ***sabinus*** sp. n. (p. 171)
– Aedeagus with shaft shorter, 2 times length of basal apodeme (Fig. 783). New Guinea ***lavinia*** sp. n. (p. 170)
163(161) Aedeagus with processes reaching midlength of shaft (Figs 805, 818) 164
– Aedeagus with processes not reaching midlength of shaft (Figs 800, 810) 165
164(163) Pygophore processes with apex directed laterally (Fig. 807); length 4·64 mm; vertex flattened. Australia ..... ***pallas*** sp. n. (p. 174)
– Pygophore processes with apex directed dorsally (Fig. 820); length 6–7 mm; vertex not flattened. Borneo ..... ***diomede*** sp. n. (p. 175)
165(163) Aedeagus with socle extended ventrally, its lower margin level with or ventrad of basal articulation, gonopore with ventral margin distad of basal apodeme (Fig. 800); style without subapical spur on ventral margin (Fig. 804). New Guinea ..... ***othrys*** sp. n. (p. 173)
– Aedeagus with socle not extended ventrally, its lower margin dorsad of basal articula-

tion, gonopore extending to level of basal apodeme (Fig. 810); style with subapical spur on ventral margin (Fig. 815). New Guinea, New Britain, Borneo... ***zeus*** sp. n. (p. 175)

166(142) Aedeagus with a pair of apical processes on shaft (Fig. 894) 167

– Aedeagus without processes, sometimes with lamellate expansions (Figs 851, 855) 169

167(166) Aedeagus with shaft very slender, directed ventrally at base and then turning dorsally, apical processes extending to midlength of shaft (Fig. 884); style without lamellate expansion on ventral margin (Fig. 887). Borneo ..... ***adrastus*** sp. n. (p. 188)

– Aedeagus with shaft more robust, not directed ventrally at base, apical processes not reaching midlength of shaft (Fig. 879); style with lamellate expansion on ventral margin of apical process over its distal half (Fig. 883) 168

168(167) Aedeagus with apical processes directed ventrally, their apices turned slightly anteriorly (Fig. 893); style with acute projection subapically on ventral margin (Fig. 892). Philippines, Borneo ..... ***laodamia*** sp. n. (p. 189)

– Aedeagus with apices of apical processes turned slightly posteriorly (Fig. 879); style without acute projection subapically on ventral margin (Fig. 883). Philippines ***cyprian*** sp. n. (p. 188)

169(166) Aedeagus robust, shaft very short, recurved anteriorly, basal apodeme very short (Fig. 864) 176

– Aedeagus less robust, sometimes elongate, shaft slender, long, directed dorsally, basal apodeme long (Figs 838, 842) 170

170(169) Aedeagus with triangular lamellate expansions subapically on posterior margin (Fig. 855); style with apical process turned abruptly dorsoposteriorly approximately two-thirds distance from base (Fig. 858). West Malaysia..... ***eumenides*** sp. n. (p. 182)

– Aedeagus and style not as above 171

171(170) Aedeagus with shaft terminating in a pair of lateral, distally acute, lamellate lobes extending distad of shaft (Figs 846, 847) 172

– Aedeagus with lamellate expansions not as above and not extending distad of shaft..... 174

172(171) Aedeagus with socle enlarged, its height exceeding that of basal apodeme, space between apical lobes V-shaped (Figs 846, 847) 173

– Aedeagus with socle not enlarged, its height less than that of basal apodeme, space between apical lobes U-shaped (Figs 851, 852). West Malaysia..... ***janus*** sp. n. (p. 182)

173(172) Pygophore processes extending to near posterior margin of pygophore lobes (Fig. 848). Borneo..... ***vesta*** sp. n. (p. 182)

– Pygophore processes not extending beyond midlength of pygophore lobes (Fig. 845). Java, Borneo ..... ***palinurus*** sp. n. (p. 180)

174(171) Aedeagus with anterior incision approximately two-thirds length of gonopore (Fig. 830). Philippines..... ***iulus*** sp. n. (p. 178)

– Aedeagus with anterior incision less than half length of gonopore (Fig. 838) 175

175(174) Aedeagus with lateral margins expanded keel-like over distal third (Fig. 837). Philippines, Borneo, West Malaysia..... ***anchises*** sp. n. (p. 180)

– Aedeagus with lateral margins expanded keel-like over mid section and also subapically (Fig. 839). Sulawesi ..... ***alcides*** sp. n. (p. 180)

176(169) Subgenital plates with long hair-like setae, at least basally on dorsolateral margin (Fig. 901) 177

– Subgenital plates without long hair-like setae but with scattered short setae (Figs 873, 874). Australia ..... ***brooksi*** Evans (p. 186)

177(176) Aedeagus with shaft broad in lateral aspect, gonopore and anterior incision extending to near midlength of shaft (Fig. 864); style with apical process expanded over distal half (Fig. 866); colour stramineous 178

– Aedeagus with shaft narrow in lateral aspect, gonopore and anterior incision apical (Fig. 904); style with apical process not expanded over distal half, ventral margin sometimes acuminate or with small projection (Fig. 906); colour stramineous with dark brown spots on dorsum, forewings also transversely banded 180

178(177) Pygophore processes straight, directed dorsally and slightly posteriorly from base (Fig. 877). Bonin Islands ..... ***ogasawarensis*** (Matsumura) (p. 186)

– Pygophore processes sinuate, directed posteriorly at least basally (Fig. 867) 179

179(178) Pygophore processes directed posteriorly to near apex, the latter turned dorsoposteriorly, ventral margin acuminate over distal half (Fig. 861). Philippines.... ***nereus*** sp. n. (p. 184)

– Pygophore processes directed posteriorly to near midlength, distal half turned dorsopos-

teriorly, ventral margin with small spur-like projection subapically (Fig. 867). Philippines ... ***tullus*** sp. n. (p. 186)

180(177) Pygophore processes turned dorsally from base (Fig. 905). New Guinea ... ***remus*** sp. n. (p. 192)

– Pygophore processes directed posteriorly ... 181

181(180) Pygophore processes with distal half straight in lateral aspect (Fig. 899). New Guinea ***dymas*** sp. n. (p. 191)

– Pygophore processes with distal half sinuate in lateral aspect (Fig. 909). Australia, New Guinea ... ***lentiginosus*** (Kirkaldy) (p. 193)

182(1) Aedeagus with apical processes ... 183

– Aedeagus without apical processes ... 184

183(182) Aedeagus with three pairs of apical processes. New Guinea ... ***telamon*** sp. n. (p. 203)

– Aedeagus with one pair of apical processes. New Guinea ... ***enyo*** sp. n. (p. 204)

184(182) Aedeagus with shaft short, robust (Figs 912, 918) ... 185

– Aedeagus with shaft slender, elongate (Figs 924, 930) ... 186

185(184) Vertex raised above level of pronotum with its posterior margin declivous; pronotum depressed anteriorly on each side of midline; scutellum transversely depressed at level of scar; forewings with veins elevated and with additional cross veins; length 8·5 mm; pygophore processes turned gradually dorsoposteriorly at midlength and slightly expanded subapically. New Guinea ... ***thestor*** nom. n. (p. 194)

– Vertex, pronotum, scutellum and forewings not as above; length 7 mm; pygophore processes turned abruptly dorsad immediately distad of midlength, not expanded subapically. New Guinea ... ***leto*** sp. n. (p. 194)

186(184) Pygophore processes with elongate process arising mesally near midlength (Fig. 926); apical process of style without subapical projection (Fig. 927). New Guinea ***boschmai*** Blöte (p. 196)

– Pygophore processes not as above, sometimes with small subapical projection on dorsal or lateral margin (Figs 948, 964); apical process of style with pronounced subapical projection (Figs 947, 955), rarely absent (Fig. 963) ... 187

187(186) Pygophore processes turned ventrad distally, with 1–2 small subapical projections, or acutely ridged (Figs 948, 954, 959) ... 188

– Pygophore processes not as above, slightly expanded subapically with or without marginal serrations (Figs 932, 939) ... 191

188(187) Styles with apical process strongly expanded to midlength, abruptly narrowed to apex over distal half (Fig. 947) ... 189

– Styles with apical process only slightly expanded to midlength, gradually narrowed to apex over distal half (Figs 958, 963) ... 190

189(188) Styles with subapical projection on ventral margin elongate and slender (Fig. 947). New Guinea, New Britain ... ***xanthus*** sp. n. (p. 200)

– Styles with subapical projection on ventral margin short and triangular (Fig. 955). New Guinea ... ***briseis*** sp. n. (p. 202)

190(188) Styles with pronounced subapical projection on ventral margin (Fig. 958); pygophore processes with subapical projection small, spur-like (Fig. 960). New Guinea ***artemis*** sp. n. (p. 202)

– Styles without subapical projection on ventral margin (Fig. 963); pygophore processes with subapical projection finger-like (Fig. 965). New Guinea ... ***iris*** sp. n. (p. 202)

191(187) Pygophore processes robust, sinuate and dorsally serrate over distal half (Fig. 932). New Guinea ... ***semele*** sp. n. (p. 198)

– Pygophore processes not as above ... 192

192(191) Styles with apical process expanded to midlength, abruptly narrowed to slender distal half, with small teeth on ventral margin at midlength (Fig. 940). New Guinea ***nitens*** Blöte (p. 199)

– Styles with apical process expanded to distad of midlength, slender apical portion relatively shorter, without teeth on ventral margin (Fig. 944). New Guinea ***hermes*** sp. n. (p. 199)

Batracomorphus angustatus (Osborn)

(Figs 1–5)

Bythoscopus angustatus Osborn, 1934*a*: 166. Holotype ♂, TONGA ISLANDS (BMNH) [examined].
Eurinoscopus punctatus Evans, 1940: 10. Holotype ♂, AUSTRALIA (QM) [examined]. **Syn. n.**

Length: ♂, 4·16–4·96 mm (mean 4·58 mm).

Punctures on forewings occasionally dark brown.

Male genitalia. Pygophore processes slender, straight or slightly sinuate, directed posteriorly, tapering gradually to acute apex. Styles with apical process markedly swollen over distal half, tapering to acute, dorsally hooked apex. Aedeagus simple; shaft directed dorsally; gonopore extending to just basad of midlength of shaft; anterior incision slightly shorter than gonopore.

REMARKS. This species differs from the majority in having the vertex flattened rather than continuously curved to the face. The pygophore processes are either straight, as illustrated here, or slightly sinuate, as illustrated previously (Knight, 1974), the two forms plus intermediates occurring together in Australia, New Zealand, New Caledonia, New Hebrides, Samoa and Tonga. Specimens from Fiji, Kermadecs, Philippines, Lesser Sunda Islands, Timor and Java show only the straight form. The configuration of the process depends to some extent on the aspect. Specimens from Sandakan Island, Timor and Java all have the shaft of the aedeagus distad of the lower limit of the gonopore slightly wider than normal whilst that from Sandakan Island also has the anterior incision slightly longer than the gonopore.

DISTRIBUTION. Australia*, Borneo*, Fiji*, Java*, Kermadecs, Lesser Sunda Islands*, New Caledonia, New Hebrides, New Zealand, Niue, Norfolk Island, Philippines*, Ryukyu Islands*, Samoa, Timor*, Tonga (* new records).

MATERIAL EXAMINED

Bythoscopus angustatus Osborn, holotype ♂, **Tonga Islands**: Vava'u, Neiafu, 1.iii.1925 (*P. A. Buxton & G. H. Hopkins*) (BMNH). *Eurinoscopus punctatus* Evans, holotype ♂, **Australia**: Queensland, Darling Downs, lucerne, 14.ix.1939 (*D. O. Atherton*) (QM).

Australia: 39 ♂, 11 ♀, New South Wales, Queensland, South Australia and Western Australia (BMNH, BPBM). **Borneo**: 1 ♂, Sabah (BPBM). **Fiji**: 13 ♂, 19 ♀, Kambara, Ovalau, Taveuni, Vanua Levu and Viti Levu (DSIR, BMNH, BPBM). **Java**: 1 ♂ (BPBM). **New Caledonia**: 3 ♂, 5 ♀ (BPBM). **New Hebrides:** 10 ♂, 13 ♀, Efate, Erromanga, Espiritu Santo and Malekula (BMNH, BPBM, SAM). **Philippines**: 28 ♂, 12 ♀, Basilan Island, Culion Island, Luzon and Palawan (BPBM, FMNH, USNM). **Ryukyu Islands**: 6 ♂, 5 ♀, Okinawa (FMNH). **Samoa**: 10 ♂, 1 ♀, Savaii and Tutuila (BPBM). **Sangeang Island**: 1 ♂ (BPBM). **Timor**: 1 ♂ (BPBM). **Tonga**: 25 ♂, 57 ♀, Eua, Tongatapu and Vavau (BPBM).

Batracomorphus atrifrons (Metcalf)

(Figs 6–10)

Bythoscopus atrifrons Metcalf, 1946: 136. Holotype ♂, GUAM (BPBM) [examined].

Length: ♂, 3·75–4·00 mm (mean 3·87 mm).

Face, except clypellus, lora, gena and ring round each ocellus, dark brown.

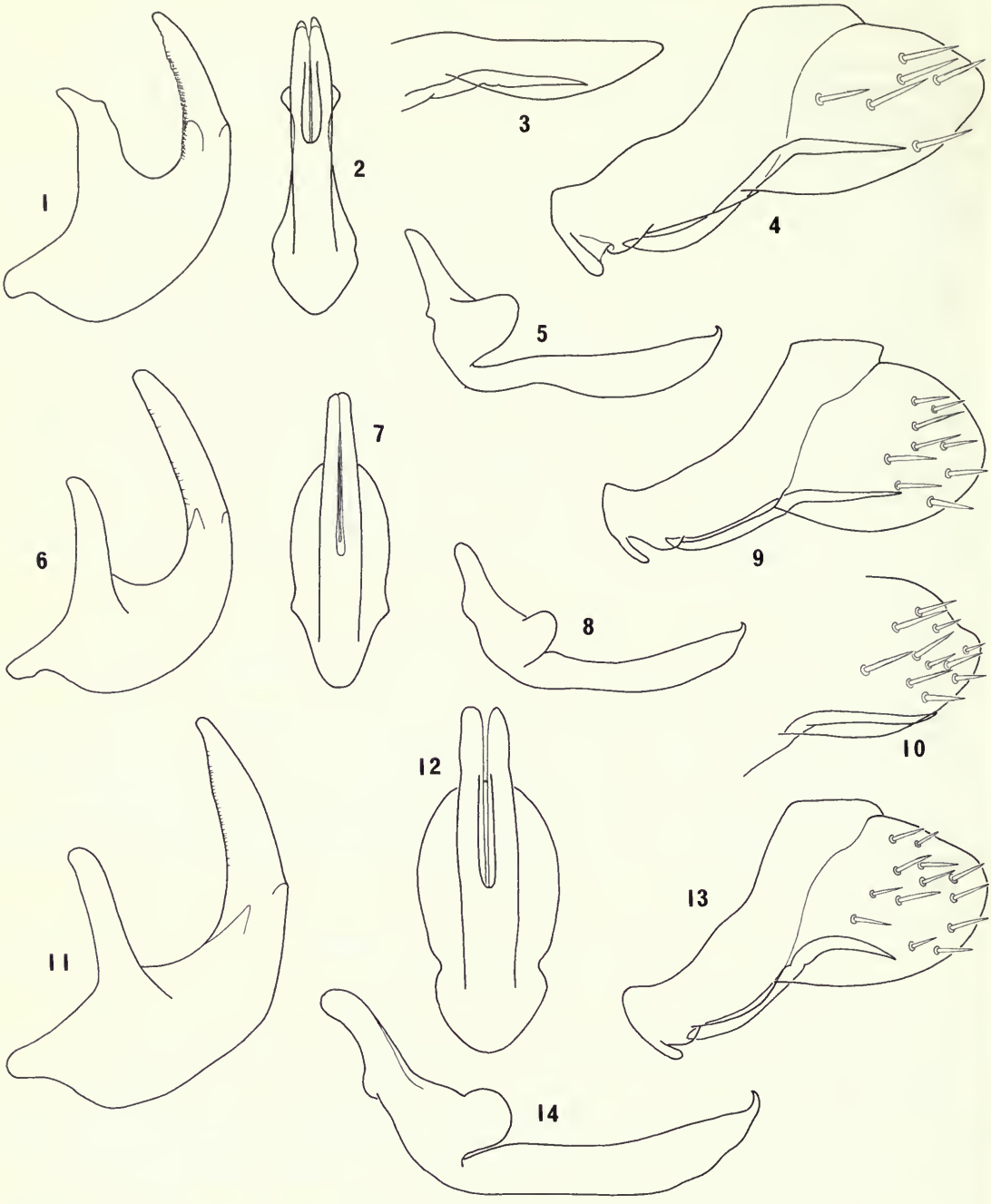
Male genitalia. Pygophore processes simple, slender, straight, directed posteriorly, tapered to acute apex with latter sometimes turned slightly dorsad. Style with apical process slightly expanded over distal half, tapering to acute dorsally hooked apex. Aedeagus simple; shaft slender, directed dorsally; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly less than gonopore.

REMARKS. This species, known only from Guam and Saipan, is similar to *angustatus* but is slightly smaller and differs also in having a dark brown face, a less robust aedeagus and a more slender style.

DISTRIBUTION. Guam, Saipan.

MATERIAL EXAMINED

Bythoscopus atrifrons Metcalf, holotype ♂, **Guam**: Barrigada, 22.vii.1936 (*O. H. Swezey*) (BPBM).
Guam: 3 ♂ (BPBM).



Figs 1–14 1–5, *Batracomorphus angustatus* (Philippine specimens). (1, 2) aedeagus; (3) left pygophore lobe and process, ventral view; (4) pygophore; (5) style. 6–10, *B. atrifrons* (Guam specimens). (6, 7) aedeagus; (8) style; (9) pygophore (Yigo and Barrigada); (10) pygophore lobe and process (Mt Lamlam and Upi Trail). 11–14, *B. charybdis*: (11, 12) aedeagus; (13) pygophore; (14) style. (For further explanation see 'Techniques and methods'.)

Batracomorphus charybdis sp. n.

(Figs 11–14)

Length: ♂, 4·56 mm

Vertex, pronotum, scutellum and forewings speckled with small dark brown tubercles, those on forewings interspersed with small circular unpigmented areas.

Male genitalia. Pygophore processes short, directed posteriorly, slightly arched, tapering to acute apex. Styles with apical process only slightly expanded over distal half, tapering to acute, dorsally hooked apex. Aedeagus simple, shaft directed dorsally and tapering to apex in lateral aspect; gonopore extending approximately three-fourths length of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. This species is closely related to *angustatus* and *atrifrons* but differs in the presence of the dark brown speckling on its dorsal surface, a more robust and arched pygophore process and the relative lengths of the gonopore and anterior incision on the aedeagus.

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Luzon, Camarines Sur, Mt Isarog, Pili, 800 m, 20.iv.1965 (*H. M. Torrevillas*) (BPBM, Type No. 12, 521).

Batracomorphus collinus (Osborn) comb. n.

(Figs 15–18)

Bythoscopus collinus Osborn, 1934*b*: 242. Holotype ♀, MARQUESAS ISLANDS (BPBM) [examined].
Bythoscopus pellucidus Osborn, 1934*b*: 242. Holotype ♀, MARQUESAS ISLANDS (BPBM) [examined]. **Syn. n.**

Length: ♂, 4·48–5·28 mm (mean 4·80 mm).

Clypeus, face between eyes, and sometimes clypellus, dark brown, face rarely uniformly stramineous; forewings rarely speckled with small dark brown spots.

Head equal to or slightly wider than pronotum; eyes more prominent than usual.

Male genitalia. Pygophore processes small, finger-like, membranous, directed posteriorly. Styles with apical process expanded slightly over distal half, tapering to acute, dorsally hooked apex. Aedeagus with shaft directed dorsally, curving slightly anteriorly; gonopore extending to just basad of midlength: anterior incision shorter than gonopore, extending to midlength.

REMARKS. This species is closely related to *maculatus*, also from the Marquesas Islands. They both differ from other speces in the genus, except *punctatus*, by having the head much wider in relation to the pronotum than normal and in the eyes being more prominent. They also have a reduced and membranous pygophore process which is rare for the genus and in the Pacific area is found elsewhere only in the Australian *brooksi*.

DISTRIBUTION. Marquesas Islands.

MATERIAL EXAMINED

Bythoscopus collinus Osborn, holotype ♀, **Marquesas Islands**: Nuku Hiva, Tapuaooa, 915 m, 18.vi.1931 (*Le Bronnec & H. Tauraa*) (BPBM). *Bythoscopus pellucidus* Osborn, holotype ♀, **Marquesas Islands**: Nuku Hiva, Pukoke, Tunoa Ridge, 1063 m, 22.x.1929 (*Mumford & Adamson*) (BPBM).

Marquesas Islands: 31 ♂, Nuku Hiva and Uapou (BPBM).

Batracomorphus maculatus (Osborn) comb. n.

(Figs 19–22)

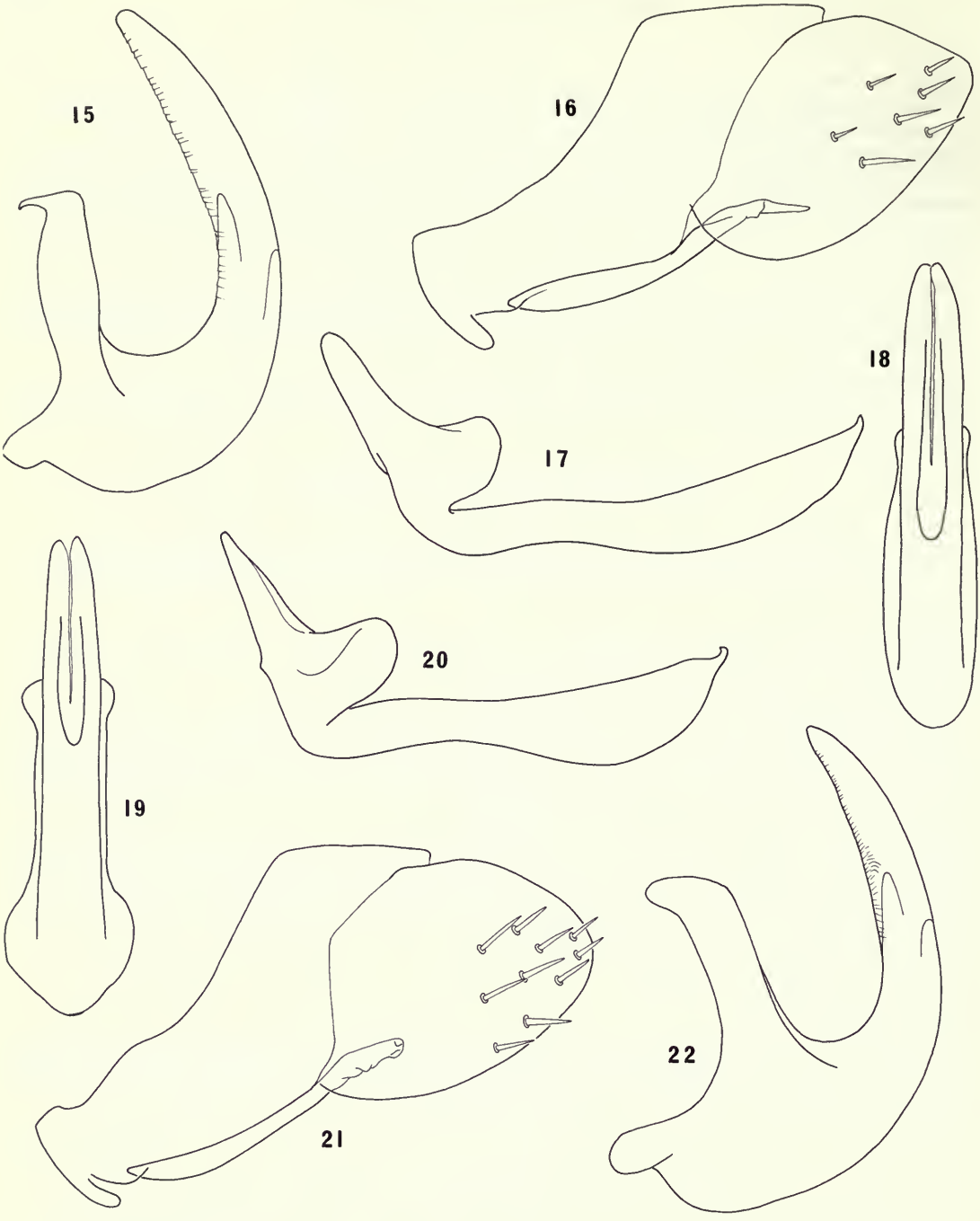
Bythoscopus maculatus Osborn, 1934*b*: 243. Holotype ♀, MARQUESAS ISLANDS (BPBM) [examined]

Length: ♂, 5·0–5·5 mm (mean 5·2 mm).

Clypeus and maxillary plates, rarely entire face, usually dark brown; apex of clavus, area of clavus adjacent to apex of scutellum, a transverse band at midlength of forewings and another across distal half of subapical cells dark brown, sometimes extending over greater area and rarely absent.

Head as wide as pronotum, or slightly narrower; eyes slightly more prominent than normal.

Male genitalia. Pygophore processes short, membranous, finger-like, directed posteriorly, indistinct.



Figs 15–22 15–18, *Batracomorphus collinus* (allotype). (15) aedeagus; (16) pygophore; (17) style; (18) aedeagus. 19–22, *B. maculatus* (paratype). (19) aedeagus; (20) style; (21) pygophore; (22) aedeagus. (For further explanation see 'Techniques and methods'.)

Subgenital plates normal, as in *harpago*, but with setae on lobe arranged in uniseriate row and those on medial surface not extending along ventral margin. Styles with apical process strongly expanded over distal half, tapering to acute, dorsally hooked apex. Aedeagus with shaft directed dorsally, curving slightly anteriorly; gonopore extending to just basad of midlength; anterior incision shorter than gonopore, extending to near midlength.

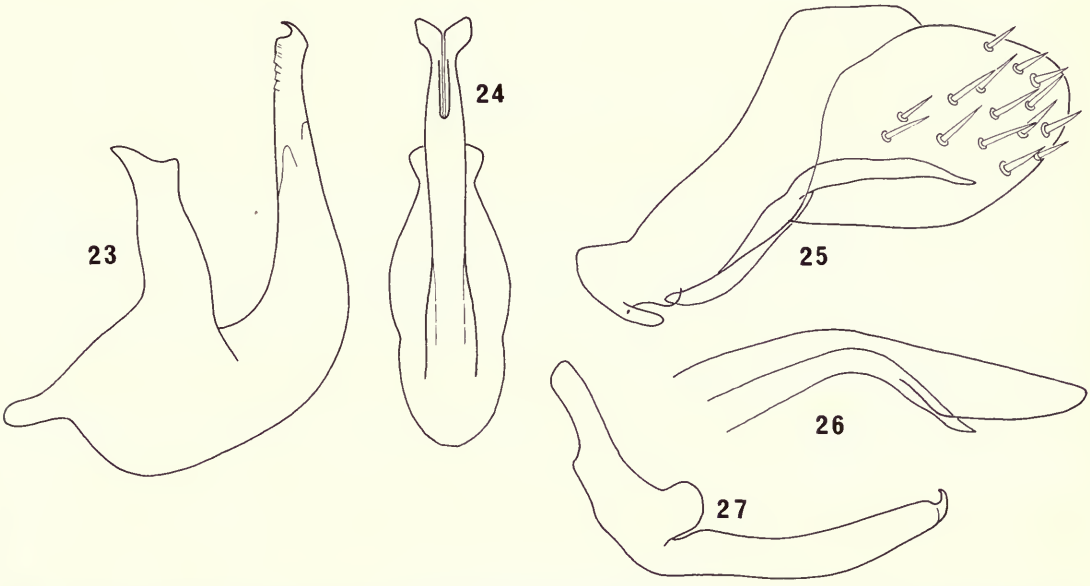
REMARKS. This species is closely related to *collinus* but differs in the coloration of the face and forewings, and in having a smaller and less distinct pygophore process, more expanded apical process on the style and more heavily setose subgenital plates. Both species are unique within the genus in having a relatively wider head than normal and more prominent eyes, features they share with only one other species, *punctatus*.

DISTRIBUTION. Marquesas Islands.

MATERIAL EXAMINED

Bythoscopus maculatus Osborn, holotype ♀, **Marquesas Islands**: Hiva Oa, Kopaafaa, 854 m, 25.ii.1930 (*Mumford & Adamson*) (BPBM).

Marquesas Islands: 8 ♂, Hiva Oa and Tahuata (BPBM).



Figs 23–27 *Batracomorphus caeneus* (West Malaysian specimens). 23, 24, aedeagus; 25, pygophore; 26, left pygophore lobe and process, ventral view; 27, style. (For further explanation see 'Techniques and methods'.)

Batracomorphus caeneus sp. n.

(Figs 23–27)

Length: ♂, 4·32–4·64 mm (mean 4·44 mm).

Male genitalia. Pygophore processes slender, directed posteriorly, arched in ventral aspect and sometimes in lateral aspect, apex acute. Styles with apical process not expanded distally, terminating in acute, dorsally hooked apex. Aedeagus robust basally; shaft relatively short, directed dorsally, tapering to apex in lateral aspect, terminating in pair of small lamellate lobes; gonopore extending approximately one-fourth length of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. This species shows some slight resemblance to *daedalus* from Sulawesi in the possession of terminal lobes on the aedeagus but is smaller and differs in the shape of the aedeagus, styles and pygophore processes.

MATERIAL EXAMINED

Holotype ♂, **West Malaysia**: Kuala Lumpur, 1.xi.1937 (*N. C. E. Miller*) (BMNH).

Paratypes. **Borneo:** 1 ♂, Sarawak (BPBM). **West Malaysia**: 3 ♂ (BMNH).

Batracomorphus charis sp. n.

(Figs 28–32)

Length: ♂, 4·32–4·40 mm (mean 4·33 mm).

Male genitalia. Pygophore processes slender, directed posteriorly, sinuate, apex acute and turned mesally or ventromesally. Styles with apical process slightly expanded over distal half, tapering to acute, dorsally hooked apex. Aedeagus simple; shaft directed dorsally; gonopore and anterior incision of approximately equal length, extending to just basad of midlength of shaft.

REMARKS. This species is similar to *pentheus* from the Philippines but has a more robust aedeagus with the gonopore and anterior incision of equal length. It is known only from the type-locality.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, Tawau, Quoin Hill, 15–20.vii.1962 (*H. Holtmann*) (BPBM, Type No. 12, 522).

Paratypes. **Borneo**: 5 ♂, Sabah (BPBM).

Batracomorphus pentheus sp. n.

(Figs 33–37)

Length: ♂, 4·16 mm.

Male genitalia. Pygophore processes elongate, slender, apex acute, directed dorsoposteriorly over basal half and then curving posteriorly, sinuate in ventral aspect with apex turned medially. Styles with apical process slender, not or little expanded over distal half, tapering to acute, dorsally hooked apex. Aedeagus simple; shaft directed dorsally, tapering to apex in lateral aspect; gonopore extending to near midlength of shaft; anterior incision shorter than gonopore, extending approximately two-fifths length of shaft.

REMARKS. This species is similar to *charis* from Borneo but has a more slender aedeagus with the anterior incision shorter than the gonopore.

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Luzon, Camarines Sur, Mt Isarog, Pili, 700 m, 28.iv.1965 (*H. M. Torrevillas*) (BPBM, Type No. 12, 523).

Batracomorphus briareus sp. n.

(Figs 38–42)

Length: ♂, 4·16–4·40 mm (mean 4·27 mm).

Pronotum sometimes speckled with small dark brown spots.

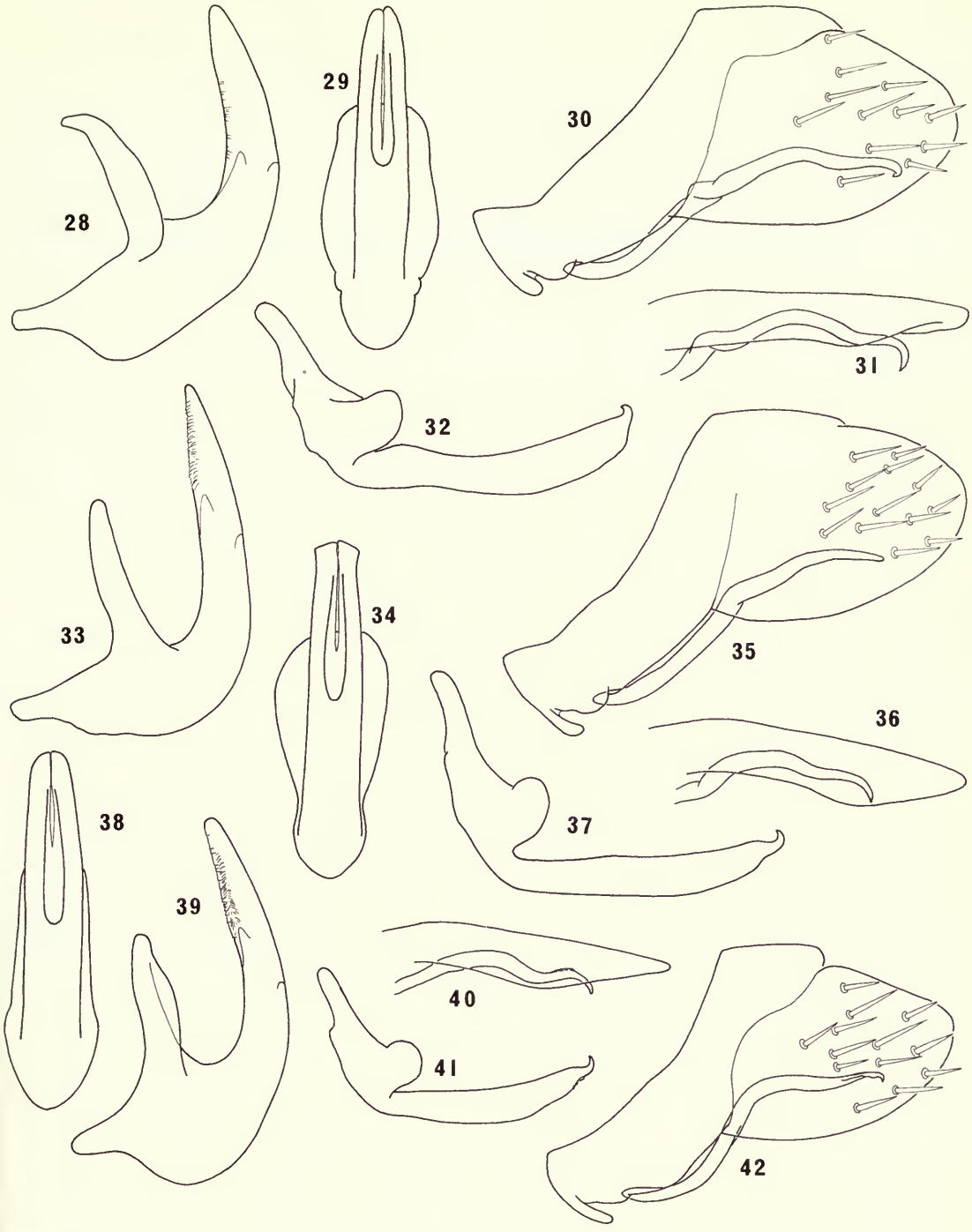
Male genitalia. Pygophore processes slender, directed posteriorly, sinuate in ventral aspect and sometimes also in lateral aspect, tapering gradually to acute apex with latter turned ventrally, mesally or ventromesally, ventrolateral margin acutely ridged subapically. Styles with apical process expanded over distal half, tapering to acute dorsally hooked apex, ventral margin sometimes very slightly ridged subapically. Aedeagus simple; shaft slender, directed dorsally; gonopore extending to just basad of midlength of shaft; anterior incision shorter than gonopore, extending approximately one-third length of shaft.

REMARKS. This species is sympatric with *angustatus* but can be distinguished by its more slender aedeagus, less expanded style and shape of the pygophore processes.

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Luzon, Mt Makiling (*Baker*) (USNM).

Paratypes. **Philippines**: 7 ♂, Luzon and Palawan (BPBM, USNM, ZM).



Figs 28–42 28–32 *Batracomorphus charis*. (28, 29) aedeagus; (30) pygophore; (31) left pygophore lobe and process, ventral view; (32) style. 33–37, *B. pentheus*. (33, 34) aedeagus; (35) pygophore; (36) left pygophore lobe and process, ventral view; (37) style. 38–42, *B. briareus*. (38, 39) aedeagus; (40) left pygophore lobe and process, ventral view; (41) style; (42) pygophore. (For further explanation see 'Techniques and methods'.)

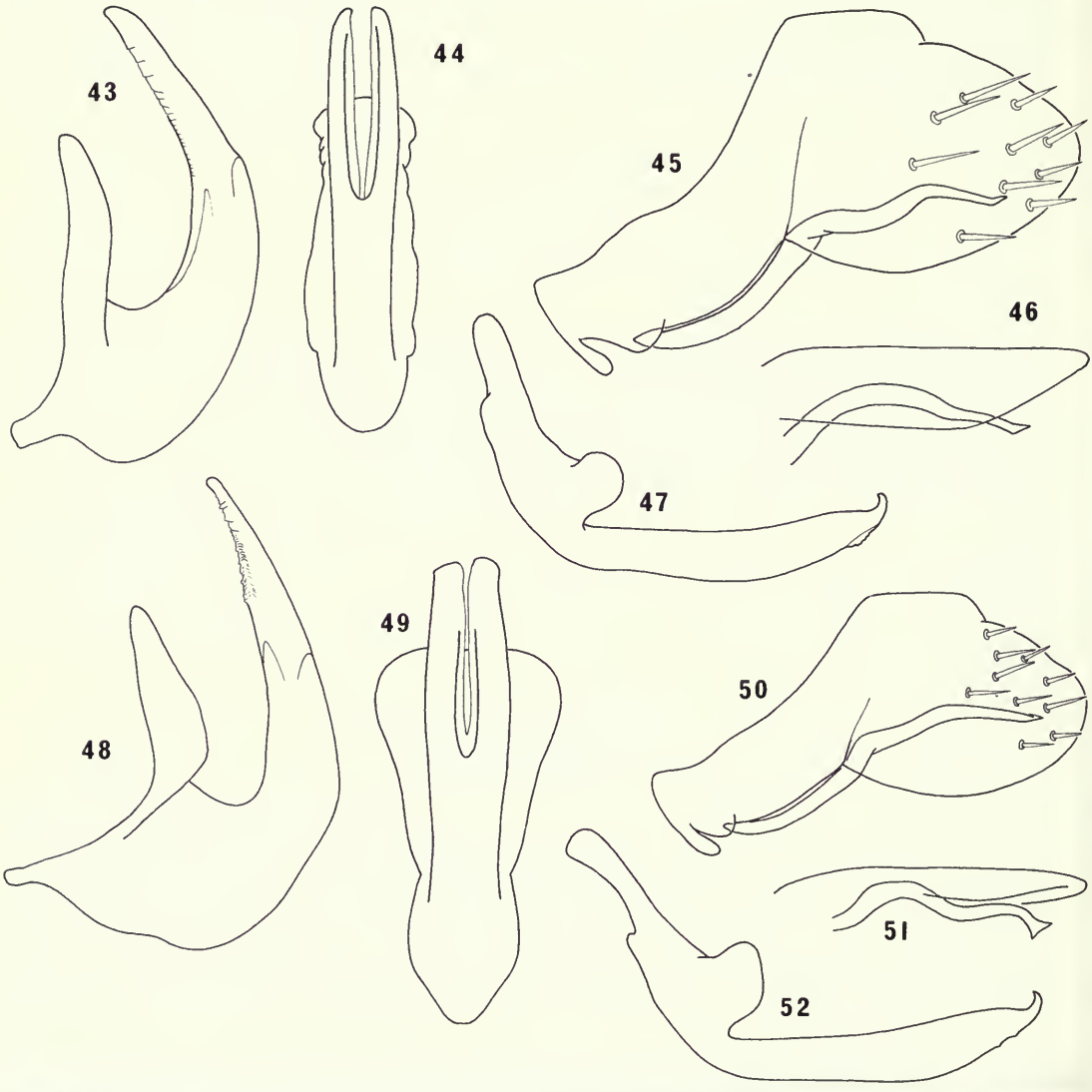
Batracomorphus deiphobus sp. n.

(Figs 43–47)

Length: ♂, 5·12 mm.

Male genitalia. Pygophore processes slender, sinuate, directed posteriorly, tapering gradually to acute apex. Styles with apical process slightly expanded over midlength, tapering to acute dorsally hooked apex, a small lamellate expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally, curving anterodorsally at midlength; gonopore extending to midlength; anterior incision extending slightly more basad than gonopore.

Remarks. This species is similar to the Philippine species *pentheus* and *briareus* in having a sinuate pygophore process but is distinguished by the recurved shaft of the aedeagus and the relative lengths of the gonopore and anterior incision.



Figs 43–52 43–47, *Batracomorphus deiphobus*. (43, 44) aedeagus; (45) pygophore; (46) left pygophore lobe and process, ventral view; (47) style. 48–52, *B. inachus*. (48, 49) aedeagus; (50) pygophore; (51) left pygophore lobe and process, ventral view; (52) style. (For further explanation see 'Techniques and methods'.)

MATERIAL EXAMINED

Holotype ♂, **West Malaysia**: Perak, Larut Hills, 1128 m, 17.ii.1932 (*H. M. Pendlebury*) (BMNH).

Batracomorphus inachus sp. n.

(Figs 48–52)

Length: ♂, 4·16–4·64 mm (mean 4·40 mm).

Forewing punctures faintly brown.

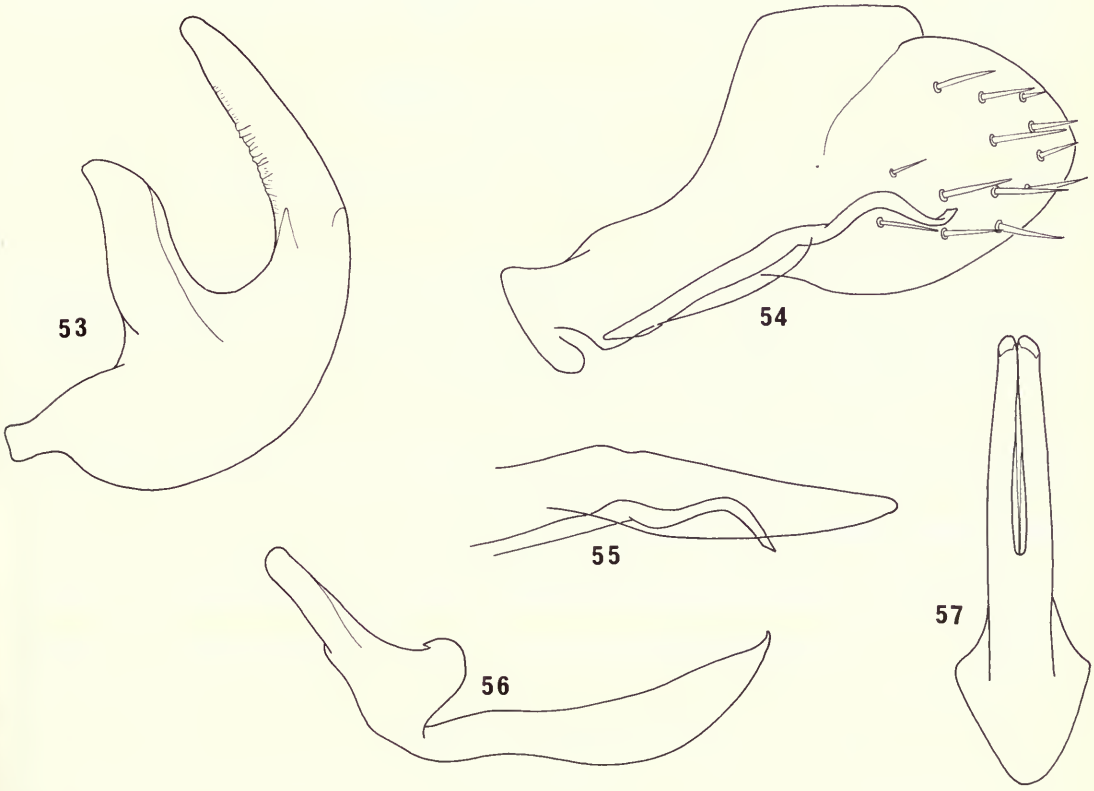
Male genitalia. Pygophore processes slender, directed posteriorly, slightly arched in lateral aspect, sinuate in ventral aspect and sometimes in lateral aspect, apex slightly expanded and truncate. Styles with apical process slightly expanded over distal half, tapering to acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, strongly tapered to apex in lateral aspect; gonopore extending to near midlength of shaft; anterior incision slightly shorter than gonopore.

REMARKS. This species is similar to *charis, pentheus* and *deiphobus* in having a sinuate pygophore process but may be distinguished by the expanded apex to its process as well as its strongly tapered aedeagus and the presence of brown punctures on the forewings. It is known only from eastern Mindanao.

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Mindanao, Misamis Or., Balason, 4–5.iv.1960 (*W. Torrevillas*) (BPBM, Type No. 12,524).

Paratypes. **Philippines**: 3 ♂, Mindanao (BPBM, FMNH).



Figs 53–57 *Batracomorphus adventitiosus* (New Zealand specimens). 53, aedeagus; 54, pygophore; 55, left pygophore lobe and process, ventral view; 56, style; 57, aedeagus. (For further explanation see 'Techniques and methods'.)

Batracomorphus adventitiosus Evans

(Figs 53–57)

Batracomorphus adventitiosus Evans, 1966: 207. Holotype ♂, New Zealand (DSIR) [examined].

Length: ♂, 4·00–5·20 mm (mean 4·49 mm).

Colour pale greenish yellow or stramineous, sometimes reddish, sometimes tinged or mottled with dark brown.

Male genitalia. Pygophore processes slender, directed posteriorly, spirally twisted, apex turned medially and obliquely truncate to acute. Subgenital plates normal in shape, as in *harpago*, but with setae absent from medial and ventral surfaces in New Zealand specimens. Styles with apical process strongly expanded over distal half, tapering to acute, dorsally hooked apex. Aedeagus simple, robust basally; shaft directed dorsally, curving anterodorsally; gonopore extending approximately two-thirds length of shaft; anterior incision equal in length to gonopore.

Remarks. This species is of interest in having the head only very slightly narrower than the pronotum and the distribution of setae on the subgenital plates reduced in New Zealand specimens. It is sympatric with *angustatus* over the more southern part of the latter's range but may be distinguished by the shape of the pygophore processes.

Distribution. Australia*, New Hebrides*, New Zealand (* new records).

Material examined

Batracomorphus adventitiosus Evans, holotype ♂, **New Zealand**: Auckland Province, Whangarei, 13.xii.1921 (*J. G. Myers*) (DSIR).

Australia: 15 ♂, 9 ♀, New South Wales, Northern Territory and Western Australia (BMNH, WADA). **New Hebrides**: 9 ♂, 11 ♀, Ambrym, Efate and Malekula (BMNH, BPBM, SAM). **New Zealand**: 43 ♂, 2 ♀, North Island and South Island (BMNH).

Batracomorphus dryas (Kirkaldy)

(Figs 58–63)

Eurinoscopus dryas Kirkaldy, 1906: 348. Holotype ♂, Australia (BPBM) [examined].

Length: ♂, 4·24–4·72 mm (mean 4·48 mm).

Forewings sometimes very faintly mottled with dark brown.

Male genitalia. Pygophore processes slender, directed posteriorly or dorsoposteriorly, curving medially, apex bifid with branches short and of approximately equal length or ventral one slightly larger, each acute apically. Styles with apical process expanded over distal half, tapering to acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally; gonopore extending approximately three-fourths length of shaft; anterior incision extending slightly more basad than gonopore.

Remarks. The single specimen from New Caledonia has the ventral branch at the apex of the pygophore process smaller than the other and, in addition, lacks dark brown mottling on the forewings. The more ventral position of the process, as shown in Fig. 63, is abnormal.

Distribution. Australia, New Caledonia* (* new record).

Material examined

Eurinoscopus dryas Kirkaldy, holotype ♂, **Australia**: Queensland, Bundaberg, 9.xii.1904 (*Koebele*) (BPBM).

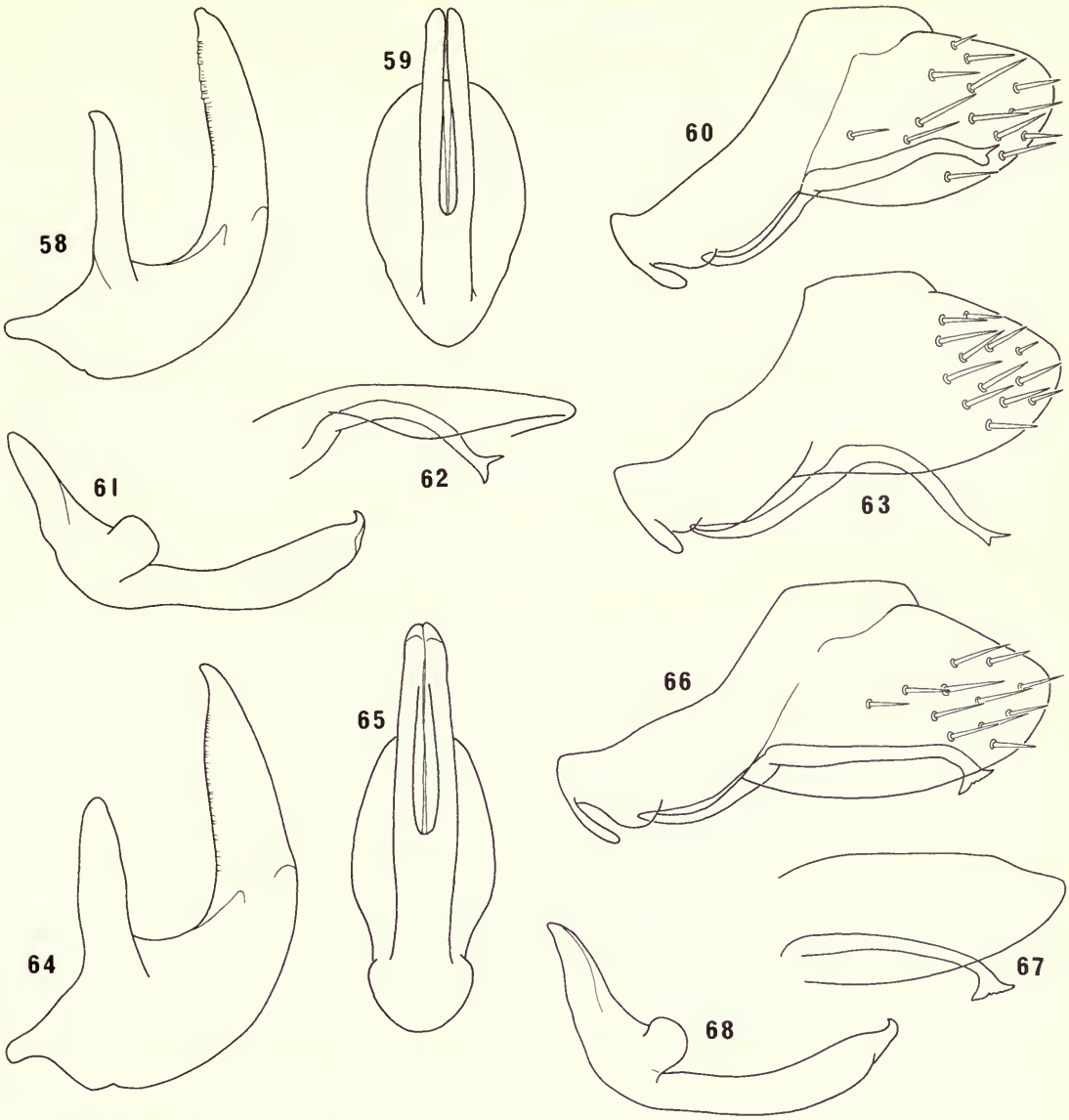
Australia: 5 ♂, 1 ♀, New South Wales and Queensland (AMNH, BMNH, BPBM). **New Caledonia**: 1 ♂, (BPBM).

Batracomorphus ancus sp. n.

(Figs 64–68)

Length: ♂, 4·88–4·96 mm (mean 4·94 mm).

Male genitalia. Pygophore processes slender, directed posteriorly, apex turned ventrally, expanded lamellate and truncate. Styles with apical process only very slightly expanded over distal half, tapering to acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, tapering to apex in lateral aspect;



Figs 58–68 58–63, *Batracomorphus dryas*. (58, 59) aedeagus; (60) pygophore (Australia), normal shape; (61) style; (62) left pygophore lobe and process (Australia), normal shape, ventral view; (63) pygophore (New Caledonia). 64–68, *B. ancus*. (64, 65) aedeagus; (66) pygophore; (67) left pygophore lobe and process, ventrolateral view; (68) style. (For further explanation see 'Techniques and methods'.)

gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.

Remarks. This species is similar to *dryas* from Australia and New Caledonia but has a more robust aedeagus. The pygophore process is also expanded and truncate apically instead of bifid. It is known only from western Mindanao and Basilan.

Material examined

Holotype ♂, **Philippines**: Mindanao, Dapitan (*Baker*) (USNM).

Paratypes. **Philippines**: 5 ♂, 6 ♀, Basilan Island and Mindanao (USNM).

Batracomorphus ilia sp. n.

(Figs 69–73)

Length: ♂, 3·92–4·16 mm (mean 4·00 mm).

Male genitalia. Pygophore processes filiform, directed posteriorly, curving dorsoposteriorly throughout length or over distal portion, apex acute. Styles with apical process expanded over distal half, abruptly narrowed to acute, dorsally hooked apex. Aedeagus simple; shaft directed dorsally; gonopore extending to near midlength of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. This species is similar to *sarpedon* and *cocles* in the shape of the pygophore process but is smaller than either. It differs from *sarpedon* also in having a relatively longer pygophore process and in the absence of dark brown spots on the forewings. It differs from *cocles,* in addition to size, by its more slender aedeagus, the absence of a subapical expansion on the style and a relatively longer and more curved pygophore process.

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Culion Island, 6 km W. of Culion, 13.vi.1962 (*H. Holtmann*)(BPBM, Type No. 12,525).

Paratypes. **Borneo**: 6 ♂, Sabah (BPBM). **Philippines**: 104 ♂, 12 ♀, Balabac, Busuanga, Culion, Mindanao and Negros (AMNH, BPBM).

Batracomorphus sarpedon sp. n.

(Figs 74–77)

Length: ♂, 4·56–5·04 mm (mean 4·75 mm).

Forewings with widely spaced small dark brown spots, sometimes extending onto posterolateral corners of pronotum.

Vertex flat.

Male genitalia. Pygophore processes slender, directed posteriorly, curving slightly dorsoposteriorly distally to variable degree, apex acute. Styles with apical process expanded over distal half, tapering abruptly to narrow apical portion and terminating in acute, dorsally hooked apex. Aedeagus simple; shaft directed dorsally, curving slightly anteriorly; gonopore extending to just basad of midlength; anterior incision extending to just basad of gonopore.

REMARKS. This species differs from most in having the vertex flat rather than continuously curved to the face. It is similar to *acrisius* from New Caledonia but is larger and with dark brown spots on the forewings. The pygophore processes are also relatively shorter in the present species and lack a subapical keel. It also resembles the Philippine species *ilia* and *cocles* but differs from the former in being larger, and from both in having dark brown spots on the forewings and a relatively shorter pygophore process.

MATERIAL EXAMINED

Holotype ♂, **Australia**: N.S.W., Cabramatta, Georges River Valley, 3.xi.1962 (*M. I. Nikitin*) (BMNH).

Paratypes. **Australia**: 11 ♂, 11 ♀, New South Wales (BMNH).

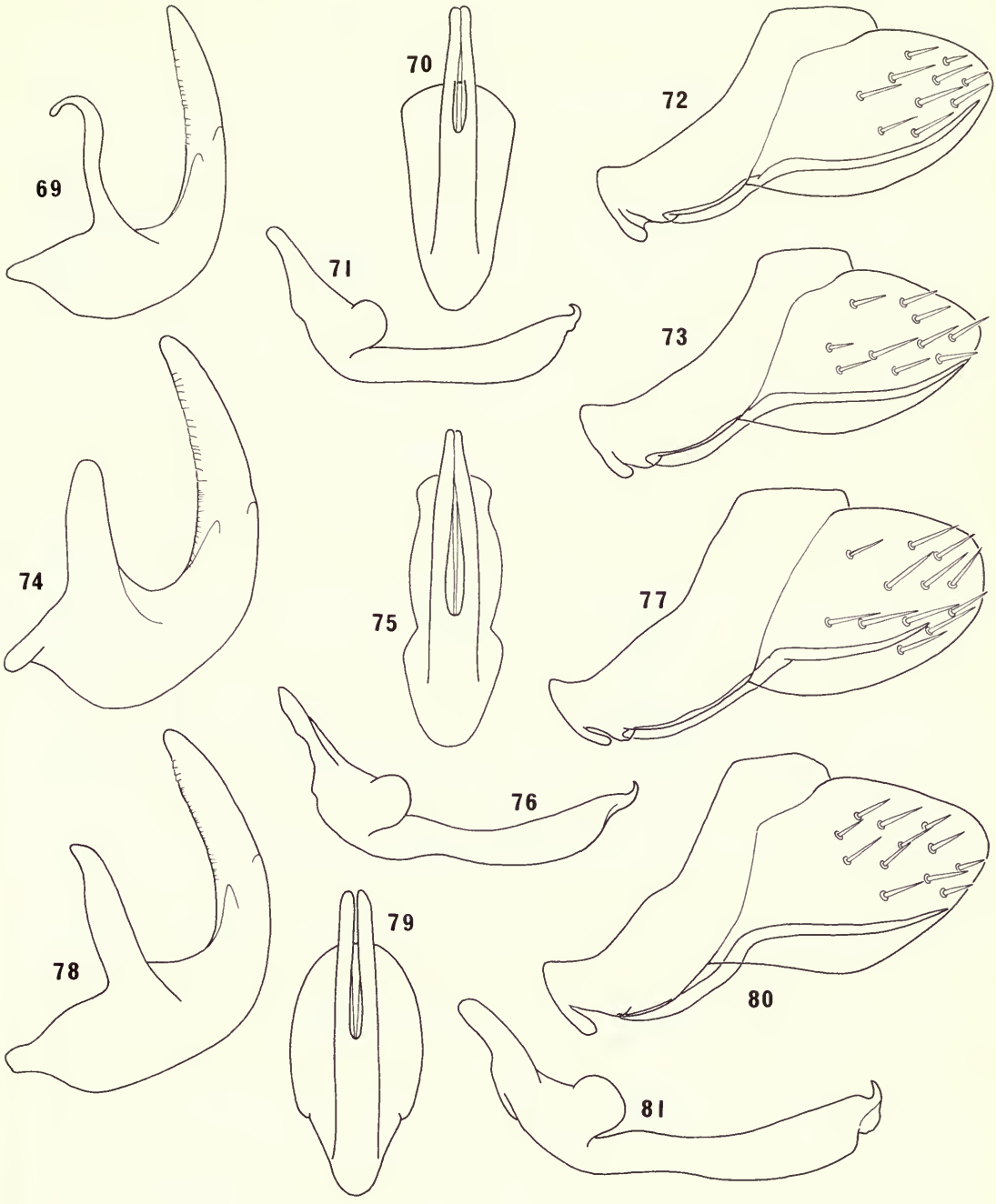
Batracomorphus cocles sp. n.

(Figs 78–81)

Length: ♂, 4·88–4·96 mm (mean 4·92 mm).

Male genitalia. Pygophore processes elongate, filamentous, directed posteriorly, apex acute and turned slightly dorsally. Styles with apical process strongly expanded over distal half, abruptly narrowed subapically to acute dorsally hooked apex, a lamellate expansion subapically on ventral margin, semicircular or triangular in shape. Aedeagus simple; shaft directed dorsally, curving slightly anteriorly; gonopore extending to near midlength; anterior incision slightly longer than gonopore.

REMARKS. The extent to which the pygophore process is turned dorsally at its apex varies between individuals. When viewed from a dorsolateral aspect the extreme apex of the process is seen to be turned posteriorly, resembling in this respect the condition present in *helenus* but to a less pronounced degree. The present species is similar to *ilia* from the Philippines and Borneo

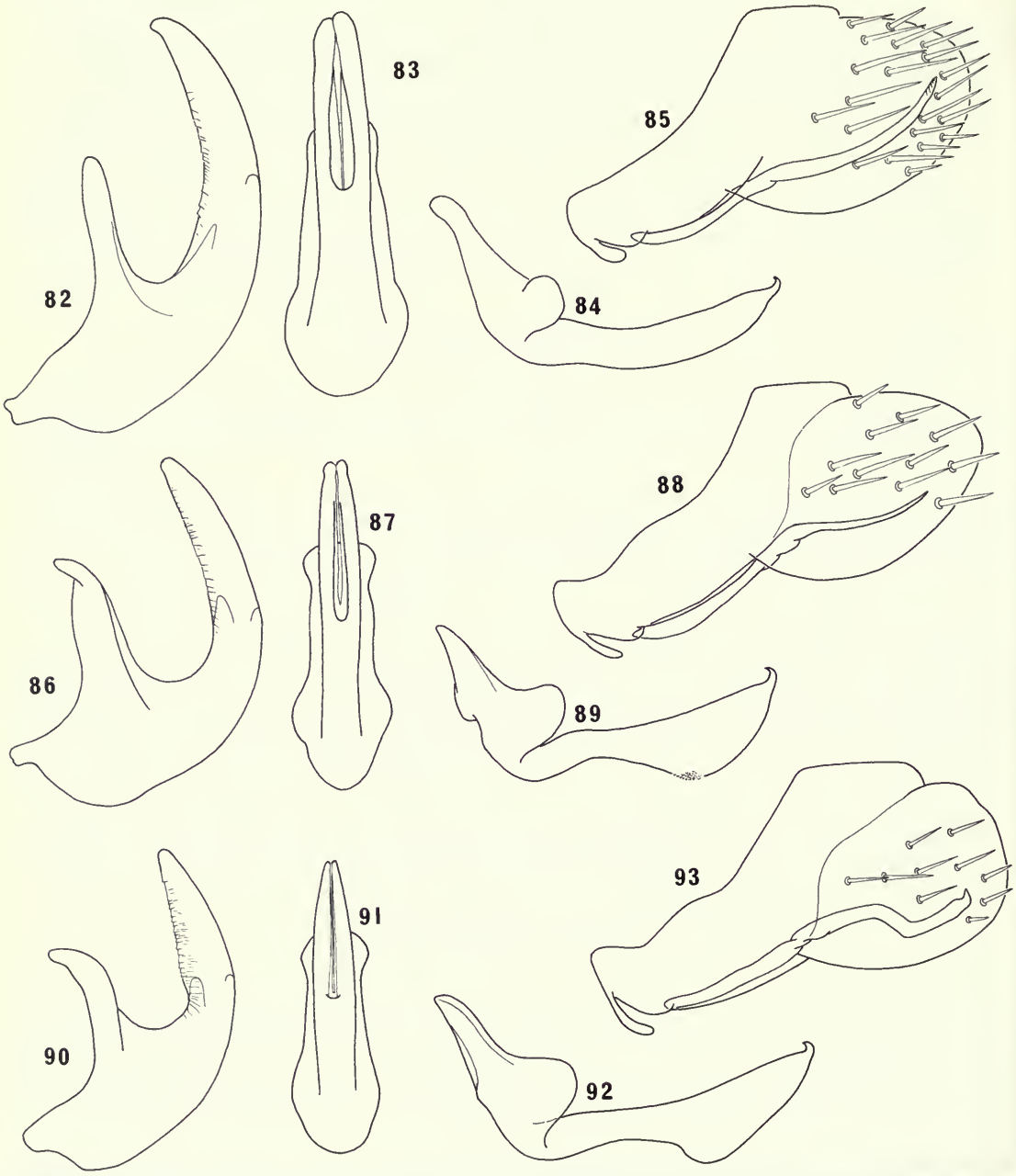


Figs 69–81 69–73, *Batracomorphus ilia* (Philippine specimens). (69, 70) aedeagus; (71) style; (72) pygophore, normal shape; (73) pygophore. 74–77, *B. sarpedon.* (74, 75) aedeagus; (76) style; (77) pygophore. 78–81, *B. cocles* (Philippine specimens). (78, 79) aedeagus; (80) pygophore; (81) style. (For further explanation see 'Techniques and methods'.)

but is larger with the aedeagus more robust, a subapical expansion on the style and the pygophore processes relatively shorter and less curved. It is similar also to *calliope* from Sarawak but is larger and with a more robust and anteriorly curved aedeagus.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, Tenompok, 10–14.ii.1959 (*T. C. Maa*) (BPBM, Type No. 12,526).
Paratypes. **Philippines**: 1 ♂, Palawan (ZM).



Figs 82–93 82–85, *Batracomorphus hecate*. (82, 83) aedeagus; (84) style; (85) pygophore. 86–89, *B. palicus*. (86, 87) aedeagus; (88) pygophore; (89) style. 90–93, *B. hamadryas*. (90, 91) aedeagus; (92) style; (93) pygophore. (For further explanation see 'Techniques and methods'.)

Batracomorphus hecate sp. n.

(Figs 82–85)

Length: ♂, 3·84–4·16 mm (mean 4·00 mm).

Vertex flat.

Male genitalia. Pygophore processes slender, directed posteriorly and curving dorsally, apex acute, annulate subapically. Styles with apical process not expanded distally, tapering to acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, recurved anteriorly; gonopore extending to midlength of shaft; anterior incision extending more basad than gonopore.

REMARKS. This species differs from most in having the vertex flat rather than continuously curved to the face. It is similar to *acrisius* from New Caledonia but has a more strongly curved pygophore process which is annulate subapically and lacks a subapical keel. It is also very similar to *ilia* from the Philippines but differs in having annulations at the apex of the pygophore processes and the apical process of the style of uniform width.

MATERIAL EXAMINED

Holotype ♂, **Australia**: N.S.W., Grenfell, 20.xii.1917 (*W.W.F.*) (BMNH).

Paratypes. **Australia**: 1 ♂, 1 ♀, New South Wales (BMNH).

Batracomorphus palicus sp. n.

(Figs 86–89)

Length: ♂, 4·00 mm.

Vertex flat.

Male genitalia. Pygophore processes filamentous, directed posteriorly and curving dorsoposteriorly, apex acute. Styles with apical process strongly expanded over distal half, tapering to acute dorsally hooked apex, a small group of minute 'teeth' on ventral margin near midlength of distal expansion. Aedeagus simple; shaft directed dorsally and curving slightly anteriorly; gonopore extending approximately two-thirds length of shaft; anterior incision slightly shorter than gonopore.

REMARKS. This species differs from most in having the vertex flattened rather than continuously curved to the face. The strongly expanded style in the present species is seen in only one other, *hamadryas* from Fiji. The two may be distinguished from each other, however, by the shape of the pygophore processes and the presence of small teeth on the ventral margin of the style in the present species. The shape of the pygophore processes in *palicus* is similar to that in the Australian *sarpedon* but the present species can be distinguished by its smaller size, the shape of the style and the absence of dark brown spots on the forewings.

MATERIAL EXAMINED

Holotype ♂, **Australia**: Queensland, Wenlock, Batavia River, 152 m, 26–29.vii.1948 (*L. J. Brass*) (AMNH).

Batracomorphus hamadryas (Kirkaldy)

(Figs 90–93)

Eurinoscopus hamadryas Kirkaldy, 1907: 39. Holotype ♂, FIJI (BPBM) [examined].

Length: ♂, 4·40–4·80 mm (mean 4·60 mm).

Forewings with appendix and apical cells sometimes fuscous; face sometimes reddish; whole body rarely reddish or reddish brown.

Male genitalia. Pygophore processes slender, directed posteriorly, slightly sinuate at midlength, apex acute, turned dorsally or sometimes medially. Styles with apical process strongly expanded over distal half, tapering to acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, turned slightly anteriorly; gonopore extending approximately three-fourths length of shaft; anterior incision equal in length to gonopore.

REMARKS. This species resembles the Australian *palicus* in the shape of the style but lacks minute teeth on the ventral margin of the latter and differs also in the shape of the pygophore process.

DISTRIBUTION. Fiji.

MATERIAL EXAMINED

Eurinoscopus hamadryas Kirkaldy, holotype ♂, **Fiji**: Rewa, 1906 (*Muir*) (BPBM).

Fiji: 40 ♂, 35 ♀, Rewa, Suva, Vanua Levu and Viti Levu (BMNH, BPBM, DSIR, USNM).

Batracomorphus latona sp. n.

(Figs 94–98)

Length: ♂, 4·72–5·12 mm (mean 4·92 mm)

Male genitalia. Pygophore processes slender, directed posteriorly, turned abruptly medially just before midlength then curving gradually laterally, apex acute. Styles with apical process only slightly expanded over distal half, tapering to acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, turning anteriorly distally; gonopore extending to just basad of midlength; anterior incision extending slightly more basad than gonopore.

REMARKS. This species resembles the Australian *sarpedon* and *hecate* in the general appearance of the male genitalia but differs from both in the abrupt change in direction of the pygophore processes. It differs also from *sarpedon* in the absence of dark brown spots on the forewings and from *hecate* in being larger and lacking the subapical annulations on the pygophore processes.

MATERIAL EXAMINED

Holotype ♂, **Australia**: Queensland, Mt Glorious, 13.ii.1961 (*L. & M. Gressitt*) (BPBM, Type No. 12,527).

Paratypes. **Australia**: 3 ♂, 1 ♀, New South Wales and Queensland (BMNH, BPBM).

Batracomorphus manlius sp. n.

(Figs 99–102)

Length: ♂, 4·32–4·48 mm (mean 4·40 mm).

Vertex flat.

Male genitalia. Pygophore processes short, slender, directed posteriorly and turned dorsoposteriorly at midlength, apex acute. Styles with apical process only slightly expanded over distal half, tapering to acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, turned anterodorsally near midlength; gonopore extending to near midlength of shaft; anterior incision equal in length to gonopore.

REMARKS. This species differs from most in having the vertex flat rather than continuously curved to the face. It resembles the widespread *angustatus* but differs in having the pygophore processes turned dorsoposteriorly at midlength and the apical process of the style less expanded over its distal half.

MATERIAL EXAMINED

Holotype ♂, **New Hebrides**: Espiritu Santo, Apouna River, Camp 2, 146 m, 26–28.viii.1971 (*G. Robinson*) (SAM).

Paratypes. **New Hebrides**: 1 ♂, 1 ♀, same data as holotype.

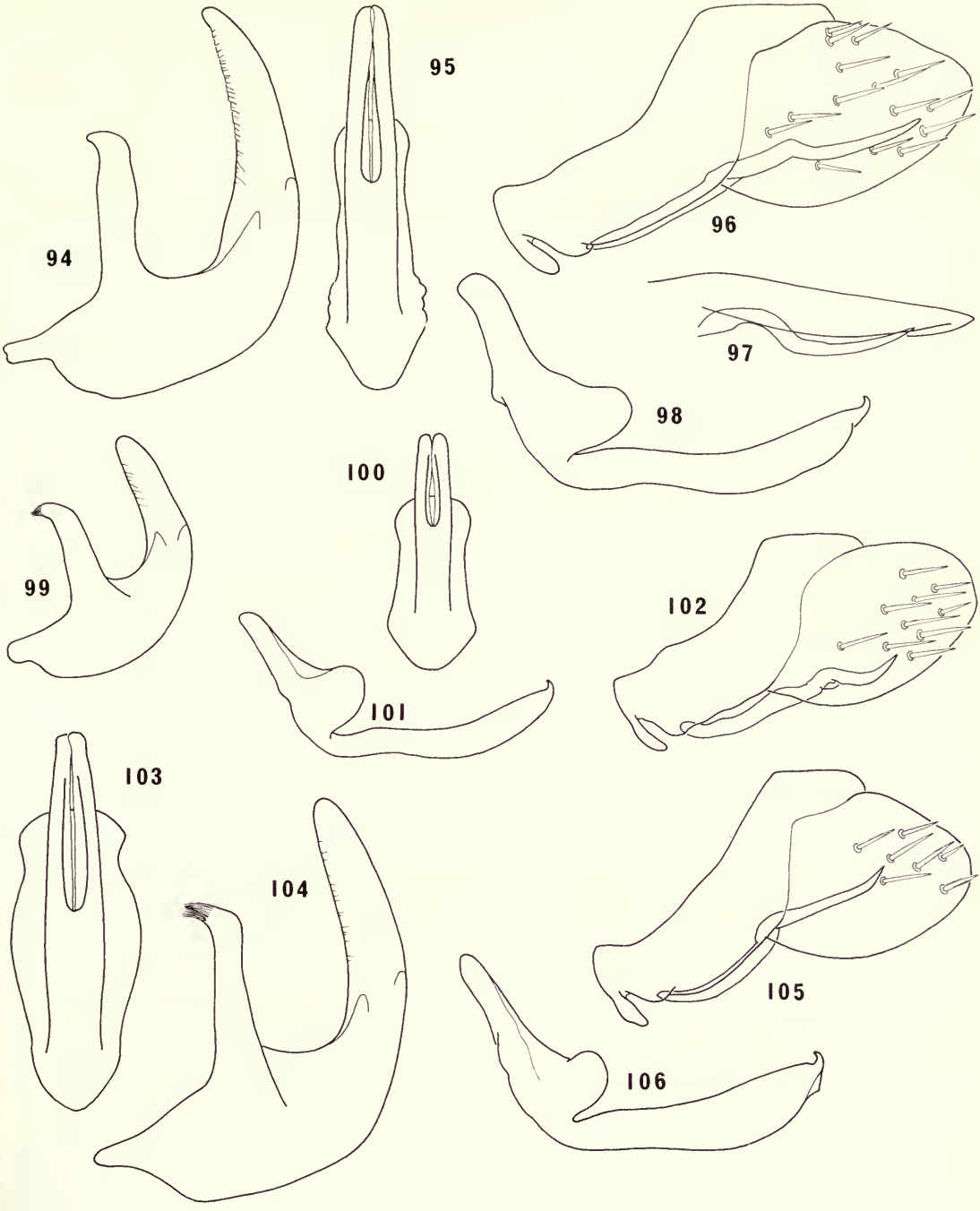
Batracomorphus tarquin sp. n.

(Figs 103–106)

Length: ♂, 4·16–5·36 mm (mean 4·52 mm).

Male genitalia. Pygophore processes slender, relatively short, directed posteriorly or dorsoposteriorly with apex acute and slightly upturned, ventral margin acuminate subapically. Styles with apical process expanded over distal half, tapering to acute dorsally hooked apex, ventral margin acuminate subapically and expanded keel-like or broadly triangular. Aedeagus simple; shaft directed dorsally and turned slightly anterodorsally; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. The single specimen from West Malaysia is larger than the Borneo specimens and has the subapical expansion on the style more narrowly triangular. This species is similar to *cocles*



Figs 94–106 94–98, *Batracomorphus latona*. (94, 95) aedeagus; (96) pygophore; (97) left pygophore lobe and process, ventral view; (98) style. 99–102, *B. manlius*. (99, 100) aedeagus; (101) style; (102) pygophore. 103–106, *B. tarquin* (Borneo specimens). (103, 104) aedeagus; (105) pygophore; (106) style. (For further explanation see 'Techniques and methods'.)

from the Philippines and Borneo but has a relatively shorter and more robust pygophore process with the apex more abruptly upturned.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, Tawau, Quoin Hill, 3–7.vii.1962 (*H. Holtmann*) (BPBM, Type No. 12,528).

Paratypes. **Borneo:** 38 ♂, Sabah (BPBM). **West Malaysia**: 1 ♂ (BMNH).

Batracomorphus io sp. n.

(Figs 107–110)

Length: ♂, 5·20 mm.

Male genitalia. Pygophore processes slender, straight, directed dorsoposteriorly, slightly expanded subapically, apex acute. Styles with apical process expanded immediately distad of midlength then tapering to acute dorsally hooked apex, a triangular expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. This species is similar to *gressitti* from Australia and *orcus* from West Malaysia and Borneo but is larger and lacks the dark brown spots present on the pronotum and forewings in *orcus*. It also differs in having the pygophore process directed more dorsoposteriorly and in the shape of the apical process of the style.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sarawak, Mt Dulit, 1220 m, moss forest, 25.x.1932 (*B. M. Hobby & A. W. Moore*) (BMNH).

Batracomorphus gressitti sp. n.

(Figs 111–114)

Length: ♂, 4·56–4·88 mm (mean 4·68 mm).

Male genitalia. Pygophore processes slender, directed posteriorly, apex acute. Styles with apical process strongly expanded over distal half, abruptly narrowed subapically to bifid apex with a short acute dorsally hooked branch and a much longer ventrally curving branch. Aedeagus simple; shaft directed dorsally; gonopore extending to just basad of midlength; anterior incision equal in length to gonopore.

REMARKS. This species is notable for the development of the apex of the style from the more basic shape. It is similar to *orcus* from Borneo and West Malaysia but has a relatively shorter pygophore process and more robust style as well as lacking dark brown spots on the pronotum and forewings.

MATERIAL EXAMINED

Holotype ♂, **Australia**: Queensland, Mt Glorious, rain forest, 24–28.ii.1961 (*L. & M. Gressitt*) (BPBM, Type No. 12,529).

Paratypes. **Australia**: 6 ♂, 1 ♀, Queensland (BMNH, BPBM).

Batracomorphus orcus sp. n.

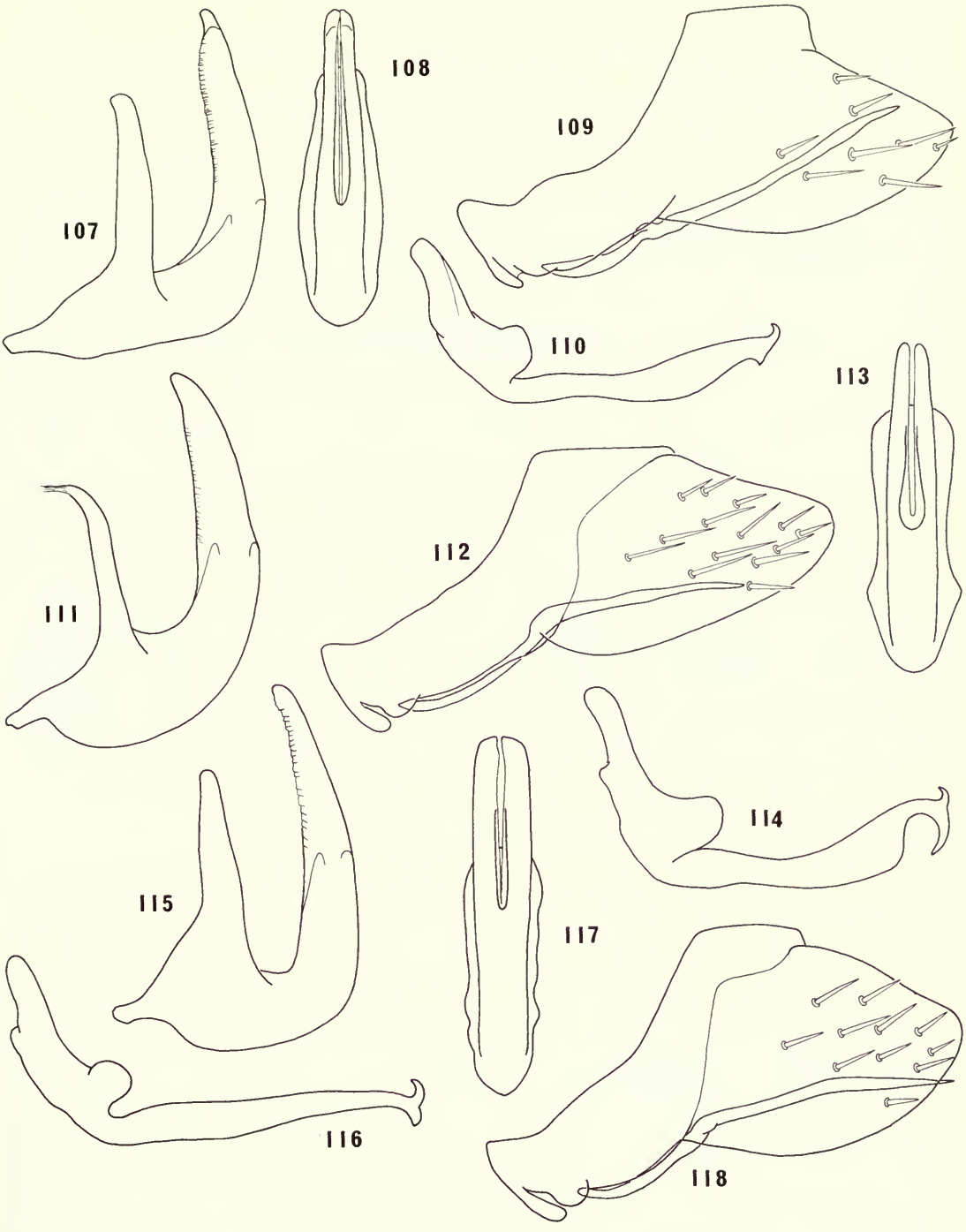
(Figs 115–118)

Length: ♂, 3·92–4·80 mm (mean 4·24 mm).

Pronotum and forewings speckled with uniformly small dark brown tubercles.

Male genitalia. Pygophore processes long, slender, directed posteriorly with distal half turned slightly more ventrad, apex acute, lateral or dorsolateral margin over apical one-third acuminate. Styles with apical process long, slender, tapering gradually to apex, latter bifid with an acute dorsally hooked branch and a ventral triangular branch of approximately equal length. Aedeagus simple; shaft directed dorsally, tapering to apex in lateral aspect; gonopore extending to near midlength of shaft; anterior incision equal in length to gonopore.

REMARKS. This species, like the previous one, is notable for the modified shape of the style from the basic and more common shape. It is similar to *gressitti* from Australia but has a relatively



Figs 107–118 107–110, *Batracomorphus io.* (107, 108) aedeagus; (109) pygophore; (110) style. 111–114, *B. gressitti.* (111) aedeagus; (112) pygophore; (113) aedeagus; (114) style. 115–118, *B. orcus* (Borneo specimens). (115) aedeagus; (116) style; (117) aedeagus; (118) pygophore. (For further explanation see 'Techniques and methods'.)

longer pygophore process and more elongate style as well as dark brown tubercles on the pronotum and forewings.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, Tawau, Quoin Hill, 15–20.vii.1962 (*Y. Hirashima*) (BPBM, Type No. 12,530).

Paratypes. **Borneo**: 5 ♂, Sabah and Sarawak (BMNH, BPBM). **West Malaysia**: 2 ♂ (BMNH).

Batracomorphus hesione sp. n.

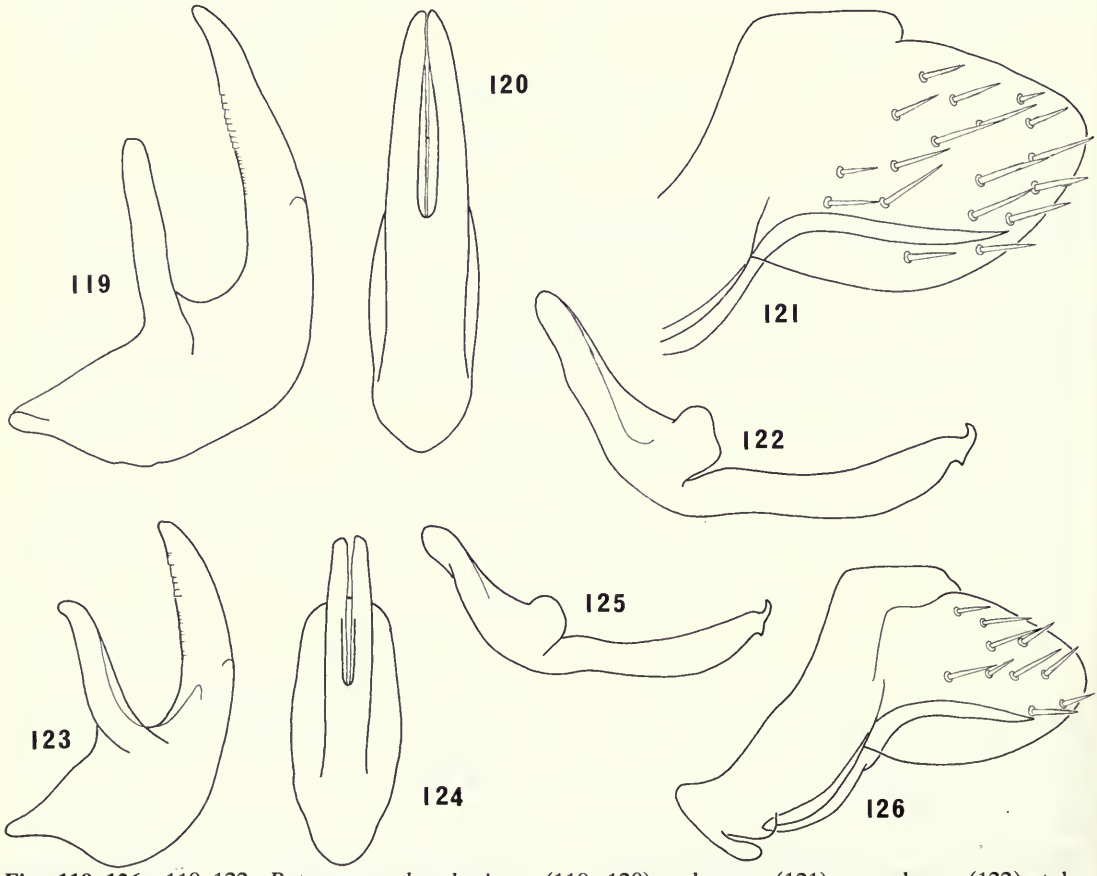
(Figs 119–122)

Length: ♂, 5·44–5·76 mm (mean 5·61 mm).

Colour reddish brown, forewings paler; vertex, pronotum, scutellum and forewings speckled with both large and small dark brown tubercles.

Male genitalia. Pygophore processes slender, directed posteriorly, apex acute. Styles with apical process slightly expanded over distal half, tapering to acute dorsally hooked apex, a small triangular expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally, turned slightly anterodorsally at midlength, tapering to apex in lateral aspect; gonopore extending to just basad of midlength; anterior incision equal in length to gonopore.

REMARKS. This species is similar to *hecuba* from New Britain but is distinguished by its larger size, the dark brown spots on the dorsum and the more robust and tapered aedeagus. It is known only from the type-locality.



Figs 119–126 119–122, *Batracomorphus hesione*. (119, 120) aedeagus; (121) pygophore; (122) style. 123–126, *B. hecuba*. (123, 124) aedeagus; (125) style; (126) pygophore. (For further explanation see 'Techniques and methods'.)

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sarawak, Mt Dulit, 1220 m, moss forest, 25.x.1932 (*B. M. Hobby & A. W. Moore*) (BMNH).

Paratypes. **Borneo**: 5 ♂, 10 ♀, Sarawak (BMNH).

Batracomorphus hecuba sp. n.

(Figs 123–126)

Length: ♂, 4·24 mm.

Male genitalia. Pygophore processes slender, directed posteriorly, apex acute. Styles with apical process expanded over distal half, tapering to acute dorsally hooked apex, a small triangular expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally, curving slightly anterodorsally; gonopore extending to just basad of midlength of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. This species is similar to *hesione* from Borneo but is smaller, lacks the dark brown spots on the dorsum and has a slightly less robust aedeagus.

MATERIAL EXAMINED

Holotype ♂, **New Britain**: Gazelle Peninsula, Mt Sinewit, 900 m, 5–9.xi.1962 (*J. Sedlacek*) (BPBM, Type No. 12,531).

Batracomorphus ajax sp. n.

(Figs 127–130)

Length: ♂, 4·48 mm.

Male genitalia. Pygophore processes slender, straight, directed posteriorly with distal half turned slightly towards midline, apex acute. Styles with apical process not expanded over distal half, tapering to acute dorsally hooked apex, a small triangular expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally, curving slightly anterodorsally; gonopore extending to just basad of midlength of shaft; anterior incision longer than gonopore, reaching to near base of shaft.

REMARKS. This species is similar to *hecuba* from New Britain but has a relatively longer pygophore process and more slender style.

MATERIAL EXAMINED

Holotype ♂, **New Hebrides**: Aneityum, Red Crest, 366 m, 4·8 km NE. of Anelgauhat, vi.1955 (*L. E. Cheesman*) (BMNH).

Batracomorphus hebrus sp. n.

(Figs 131–134)

Length: ♂, 4·24 mm.

Vertex flat.

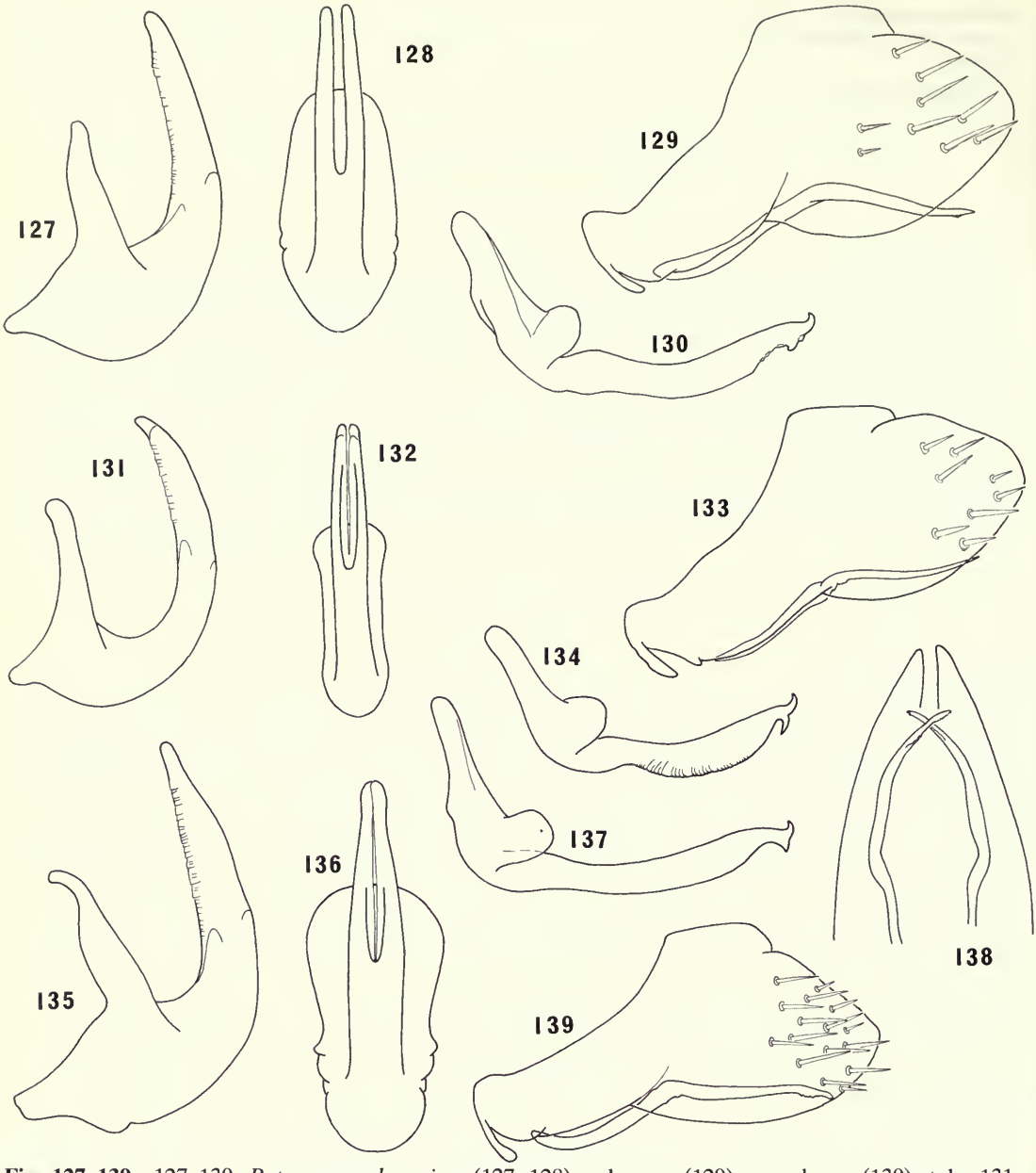
Male genitalia. Pygophore processes simple, slender, directed posteriorly, apex acute. Styles with apical process expanded over distal half, tapering to bifurcate apex with dorsal and ventral branches short, acute, of equal length. Aedeagus simple; shaft directed dorsally, curving anterodorsally; gonopore extending to just basad of midlength of shaft; anterior incision slightly shorter than gonopore.

REMARKS. This species differs from most in having the vertex flattened rather than continuously rounded to the face. It is also notable for the development of the apex of the style from the more basic shape. It is closely related to *ajax* from the New Hebrides but has a more slender pygophore process, a more elongate and markedly curved aedeagus and the apical process of the style expanded and more distinctly bifurcate.

MATERIAL EXAMINED

Holotype ♂, **New Caledonia**: Anse Vata, 1.xi.1958 (*C. R. Joyce*) (BPBM, Type No. 12,532).

Paratypes. **New Caledonia**: 2 ♀, same data as holotype (BPBM).



Figs 127–139 127–130, *Batracomorphus ajax*. (127, 128) aedeagus; (129) pygophore; (130) style. 131–134, *B. hebrus*. (131, 132) aedeagus; (133) pygophore; (134) style. 135–139, *B. laomedon*. (135, 136) aedeagus; (137) style; (138) pygophore lobes and process, ventral view; (139) pygophore. (For further explanation see 'Techniques and methods'.)

Batracomorphus laomedon sp. n.

(Figs 135–139)

Length: ♂, 4·48–4·64 mm (mean 4·58 mm).

Vertex, pronotum, scutellum and forewings speckled with small variably sized dark brown spots.

Male genitalia. Pygophore processes slender, directed posteriorly with apical one-third turned posteromedially, ventral margin acutely ridged subapically and minutely and irregularly serrate. Styles with

apical process elongate, of approximately uniform width through length, tapering to acute dorsally hooked apex, a triangular expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally, tapering to apex from midlength in lateral aspect; gonopore extending to just basad of midlength of shaft; anterior incision slightly longer than gonopore.

REMARKS. This species is similar to *ajax* from the New Hebrides but differs in the presence of dark brown spots on the dorsum, the subapical serrations on the pygophore processes and the ventrally directed rather than recurved triangular expansion on the style.

MATERIAL EXAMINED

Holotype ♂, **Solomon Islands**: Kolombangara, 1·6 km inland from Kuzi, 9.ix.1965 (BMNH).
Paratypes. **Solomon Islands**: 2 ♂, 1 ♀, Gizo and Kolombangara (BMNH, BPBM).

Batracomorphus helenus sp. n.

(Figs 140–143)

Length: ♂, 5·36 mm.

Male genitalia. Pygophore processes slender, directed posteriorly, turned dorsoposteriorly near apex with latter acute and turned posteriorly. Styles with apical process expanded over distal half, tapering to acute dorsally hooked apex, a triangular expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally, tapering to apex in lateral aspect; gonopore extending to just basad of midlength of shaft; anterior incision slightly longer than gonopore.

REMARKS. The changes in direction shown by the pygophore processes may only be visible when viewed from other than a lateral aspect due to the rotation of each process on its longitudinal axis. This species is similar to *calliope* from Borneo and *catiline* from Borneo and Sumatra. It differs from *calliope*, however, in size, and in having the subapical expansion of the style relatively larger and the apex of the pygophore process turned more distinctly posteriorly. It differs from *catiline* in having the apical posteriorly directed part of the pygophore process relatively shorter and without an acute ridge on its ventral margin. It is similar also to *cocles* from the Philippines and Borneo but is larger, and has the subapical expansion on the style more pronounced and the apical portion of the pygophore process turned more distinctly posteriorly.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, Tawau, Quoin Hill, 3–7.vii.1962 (*H. Holtmann*) (BPBM, Type No. 12,533).

Batracomorphus calliope sp. n.

(Figs 144–147)

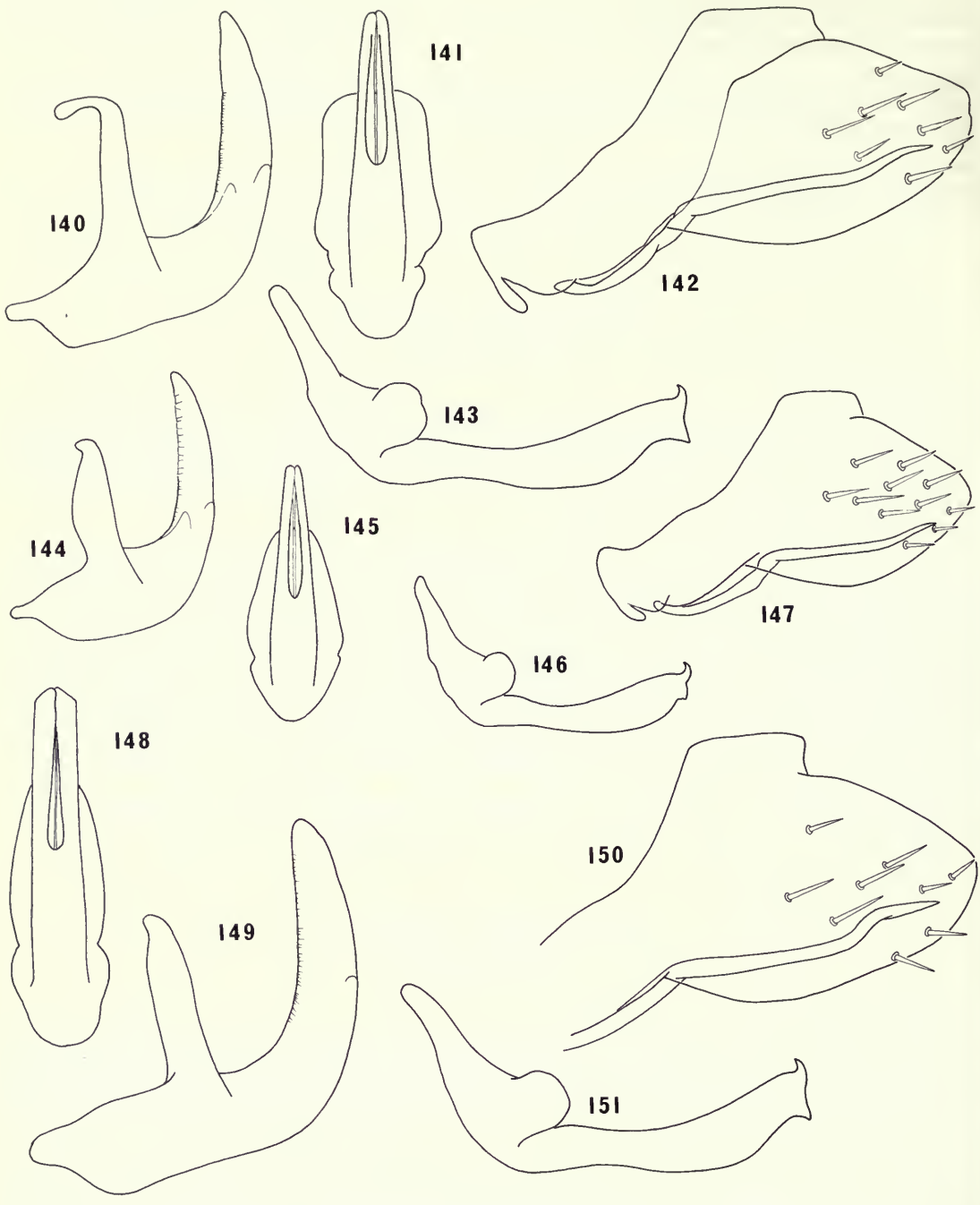
Length: ♂, 3·84 mm.

Male genitalia. Pygophore processes slender, directed posteriorly, apical one-fourth slightly upturned, apex acute. Styles with apical process expanded over distal half, tapering to acute dorsally hooked apex, a small triangular expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally, tapering to apex in lateral aspect; gonopore extending approximately two-thirds length of shaft; anterior incision slightly longer than gonopore.

REMARKS. This species is similar to *helenus* from Borneo but is much smaller, has the subapical expansion on the style less pronounced and the apex of the pygophore process upturned rather than directed posteriorly. It is also similar to the Borneo and Philippine species *cocles,* but is smaller and has the apex of the pygophore process more distinctly upturned and the shaft of the aedeagus less curved and with the gonopore and anterior incision extending more basad.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sarawak, foot of Mt Dulit, junction of rivers Tinjar and Lejok, 2.ix.1932 (*B. M. Hobby & A. W. Moore*) (BMNH).



Figs 140–151 140–143, *Batracomorphus helenus*. (140, 141) aedeagus; (142) pygophore; (143) style. 144–147, *B. calliope*. (144, 145) aedeagus; (146) style; (147) pygophore. 148–151, *B. catiline* (Borneo specimens). (148, 149) aedeagus; (150) pygophore; (151) style. (For further explanation see 'Techniques and methods'.)

Batracomorphus catiline sp. n.

(Figs 148–151)

Length: ♂, 5·20–5·76 mm (mean 5·40 mm).

Male genitalia. Pygophore processes slender, directed posteriorly, turned dorsoposteriorly near apex with latter acute and turned posteriorly, portion distad of sinuation acutely ridged ventrally. Styles with apical process expanded over distal half, tapering to acute dorsally hooked apex, a triangular expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally; gonopore extending to midlength of shaft; anterior incision equal in length to gonopore.

REMARKS. The pygophore process in this species is sometimes turned on its longitudinal axis so that the view of the process shown in Fig. 150 is visible only from a more dorsal or ventral aspect. This species is similar to *helenus* from Borneo but differs mainly in having the posteriorly directed apical portion of the pygophore process relatively longer and acutely ridged on its ventral margin.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sarawak, foot of Mt Dulit, junction of rivers Tinjar and Lejok, 26.ix.1932 (*B. M. Hobby and A. W. Moore*) (BMNH).

Paratypes. **Borneo**: 6 ♂, 2 ♀, Sabah and Sarawak (BMNH, BPBM). **Sumatra**: 1 ♂ (USNM).

Batracomorphus torquatus sp. n.

(Figs 152–155)

Length: ♂, 4·32 mm.

Forewings sparsely speckled with small variably sized dark brown spots.

Male genitalia. Pygophore processes slender, directed posteriorly, turned dorsoposteriorly near apex with latter acute and turned posteriorly, a keel-like extension subapically on ventral margin. Styles with apical process expanded slightly over distal half, abruptly narrowed to acute dorsally hooked apex, a small triangular expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally, turned slightly anterodorsally from midlength; gonopore extending to just basad of midlength; anterior incision slightly longer than gonopore.

REMARKS. This species is similar to *catiline* from Borneo and Sumatra but, in addition to being smaller and having dark brown spots on the forewings, differs by having the base of the aedeagus directed more dorsally and the subapical extension on the pygophore process more pronounced. It is closely related to *tarchon* from New Guinea but has the apex of the pygophore process directed posteriorly rather than arched ventrally, and the keel-like extension on the ventral margin of the process confined to the extreme apex. They also differ in the shape of the style apex and the presence of dark brown spots on the forewings in the present species.

MATERIAL EXAMINED

Holotype ♂, **Australia**: N. Queensland, Tulley Falls, 10.iii.1956 (*J. L. Gressitt*) (BPBM, Type No. 12,534).

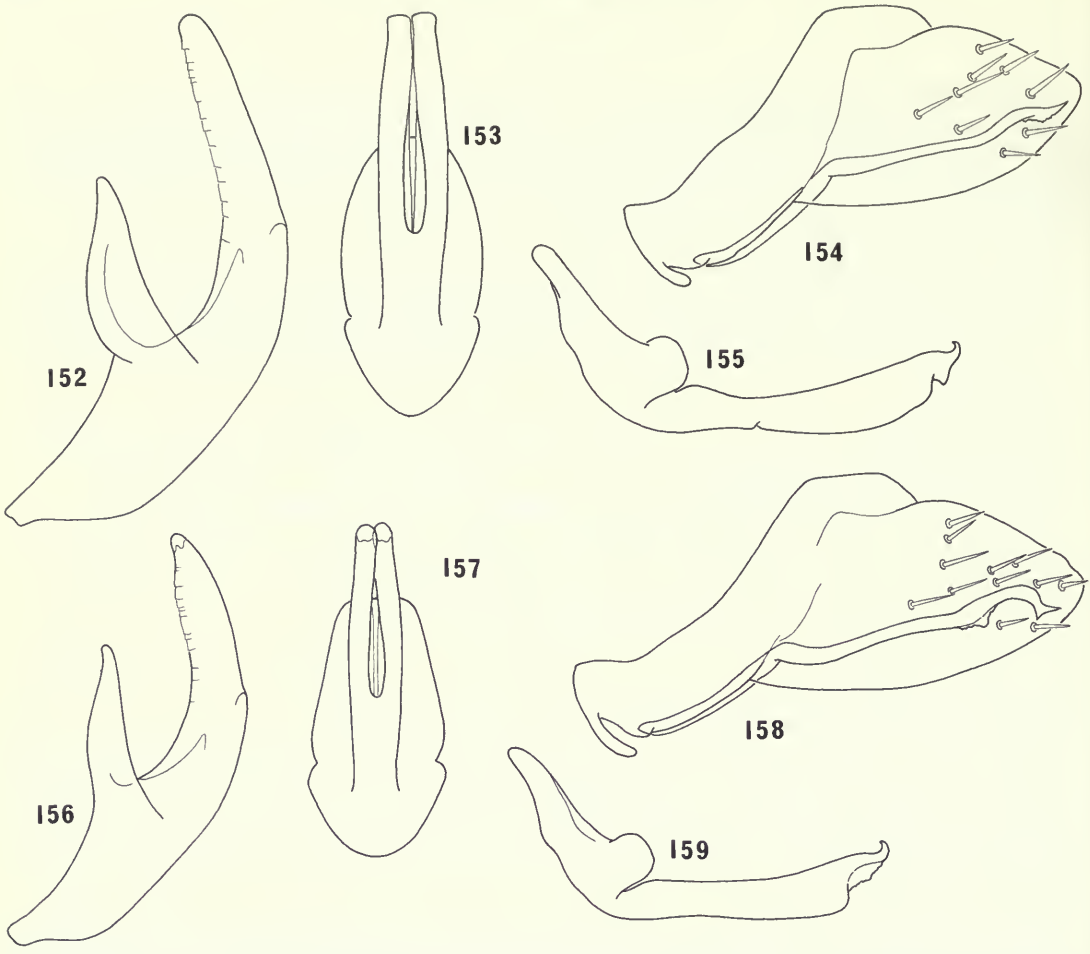
Paratypes. **Australia**: 1 ♂, 1 ♀, same data as holotype (BPBM).

Batracomorphus tarchon sp. n.

(Figs 156–159)

Length: ♂, 4·24 mm.

Male genitalia. Pygophore processes slender, directed posteriorly, distal one-third arched dorsally with apex directed ventrally and weakly bifurcate, a small lamellate expansion on ventral margin at proximal end of arch. Styles with apical process expanded over distal half, abruptly tapered subapically to acute dorsally hooked apex, a lamellate expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally and turned slightly anterodorsally at midlength; gonopore extending to just basad of midlength; anterior incision slightly longer than gonopore.



Figs 152–159 152–155, *Batracomorphus torquatus*. (152, 153) aedeagus; (154) pygophore; (155) style. 156–159, *B. tarchon*. (156, 157) aedeagus; (158) pygophore; (159) style. (For further explanation see 'Techniques and methods'.)

Remarks. This species is closely related to the Australian *torquatus* but lacks the dark brown spots on the forewings and has the apex of the pygophore process bifurcate and directed ventrally and the lamellate expansion on the ventral margin extending more basad.

Material examined

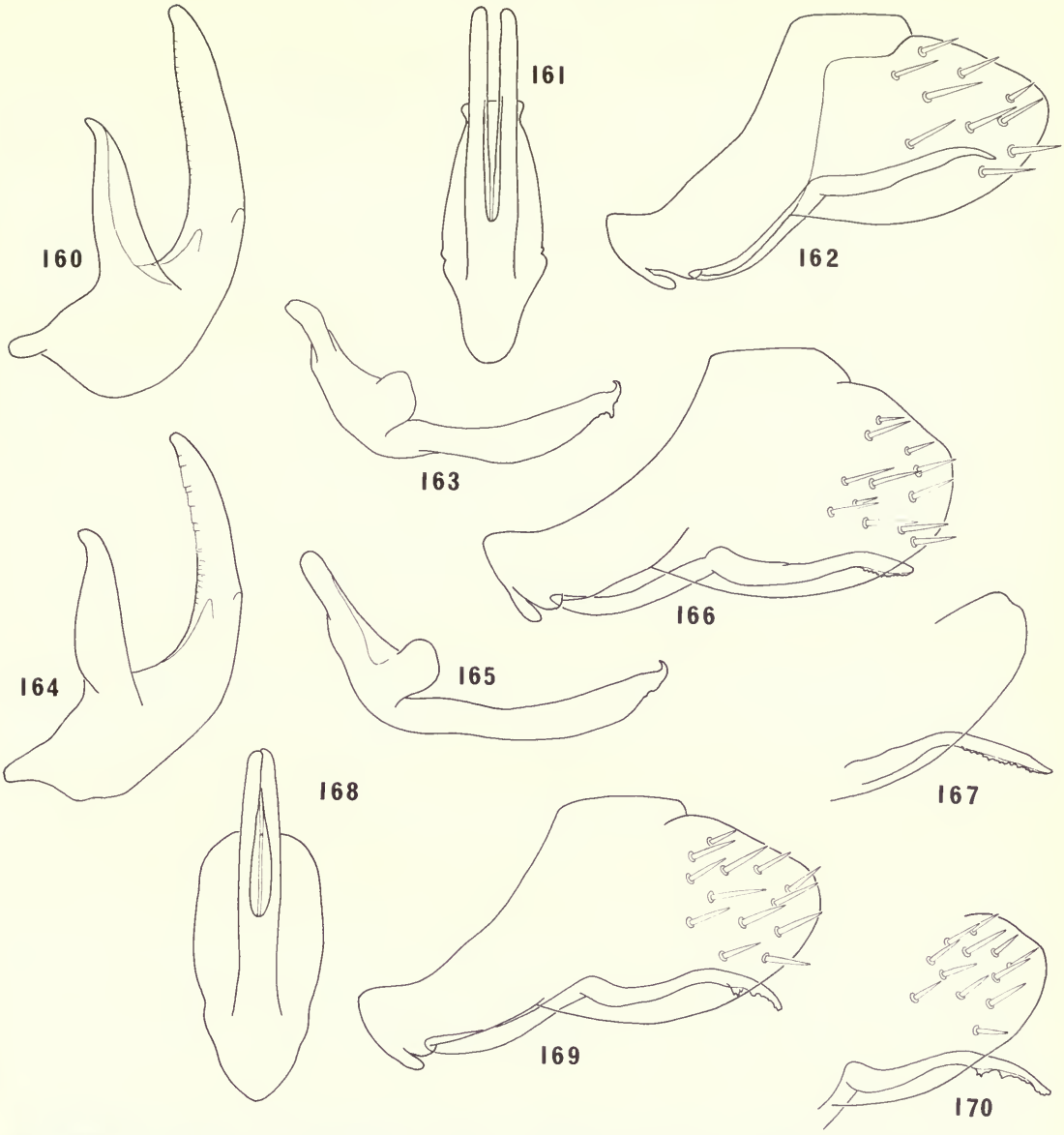
Holotype ♂, **New Guinea**: Irian Jaya, Humboldt Bay District, Bewani Mountains, 400 m, vii.1937 (*W. Stüber*) (BMNH).

Batracomorphus atreus sp. n.

(Figs 160–163)

Length: ♂, 3·68 mm.

Male genitalia. Pygophore processes slender, directed posteriorly and slightly dorsally, apex acute and turned ventroposteriorly. Styles with apical process slightly expanded over distal half, tapering to acute dorsally hooked apex, a small ventrally directed projection subapically on ventral margin. Aedeagus simple; shaft directed dorsally; gonopore extending three-fourths length of shaft; anterior incision extending slightly more basad than gonopore.



Figs 160–170 160–163, *Batracomorphus atreus*. (160, 161) aedeagus; (162) pygophore; (163) style. 164–170, *B. cybele*. (164) aedeagus; (165) style; (166) pygophore (Guadalcanal); (167) same, posterolateral view of process; (168) aedeagus; (169) pygophore (San Jorge); (170) same, posterolateral view of process. (For further explanation see 'Techniques and methods.')

Remarks. This species resembles *helenus* and *calliope* from Borneo in the apical curvature of the pygophore process but differs from both in the process being relatively more robust, the curvature being more gradual and extending more basad and the apex being turned ventroposteriorly. It is much smaller than *helenus* and differs from both also in having the subapical expansion on the style relatively smaller.

Material examined

Holotype ♂, **Australia**: N. Queensland, S. of Ravenshoe, Evelyn Tableland, 350 m, 10.iii.1956 (*J. L. Gressitt*) (BPBM, Type No. 12,535).

Batracomorphus cybele sp. n.

(Figs 164–170)

Length: ♂, 4·16–4·56 mm (mean 4·35 mm).

Forewings speckled with small, variably sized, dark brown spots, rarely absent with inner edge from apex of scutellum to appendix dark brown.

Male genitalia. Pygophore processes slender, directed posteriorly, distal half turned posteromesally with its ventral margin acutely ridged and mildly serrate, distal half rarely turned posteroventrally with lateral margin acutely ridged and serrate, apex acute. Styles with apical process of uniform width, not or only slightly expanded over distal half, tapering to acute dorsally hooked apex; small lamellate expansion, irregular or triangular in shape, sometimes present subapically on ventral margin. Aedeagus simple; shaft directed dorsally, curving slightly anterodorsally from midlength; gonopore extending to just basad of midlength; anterior incision approximately same length as gonopore.

Remarks. The absence of dark brown spots on the forewings has been noted only in specimens from San Cristoval where they occur together with normal spotted individuals. No differences in the male genitalia have been detected between the two forms. Variation in the orientation of the distal half of the pygophore process appears to be due to the rotation of the whole structure along its longitudinal axis, the abnormal condition, when present, occurring in the same population as the other. This species is similar to *laomedon*, also from the Solomon Islands, but differs in having the distal half of the aedeagus relatively more slender and recurved, the apical process of the style more robust subapically and with subapical expansion less well developed and with the pygophore processes more robust and ventral serrations more extensive. The two species also differ externally, *cybele* having the dark brown spots restricted to the forewings.

Material examined

Holotype ♂, **Solomon Islands**: Guadalcanal, Kukum, 26.i.1963 (*P. Greenslade*) (BMNH).

Paratypes. **Solomon Islands**: 84 ♂, 71 ♀, Bougainville, Buka, Choiseul, Fauro, Guadalcanal, Kolombangara, Malaita, New Georgia, Nggela, San Cristoval, San Jorge, Santa Ysabel and Small Nggela (BMNH, BPBM, USNM).

Batracomorphus circe sp. n.

(Figs 171–175)

Length: ♂, 4·80 mm.

Male genitalia. Pygophore processes slender, directed posteriorly, distal half curving ventroposteriorly with apical one-fourth turned abruptly posterolaterally, apex tapered and acute in lateral aspect, plate-like and expanded foot-like in ventral aspect. Styles with apical process elongate, of uniform width, slightly sinuate at midlength, terminating in a short acute dorsally hooked process and a slightly longer ventrally directed process. Aedeagus simple; shaft directed dorsally and slightly recurved anteriorly; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.

Remarks. The style in this species is modified from the normal condition and resembles that of *bacchusi*, also from New Guinea. The two species are also similar in the shape of the pygophore process although they differ in that that of *circe* is turned posterolaterally near the apex with the latter expanded in ventral aspect. The present species also lacks the dark brown spots present on the forewings of *bacchusi*. The shape and orientation of the pygophore processes in *circe* resemble those of *memnon* from New Guinea but the two differ in the shape of the styles.

Material examined

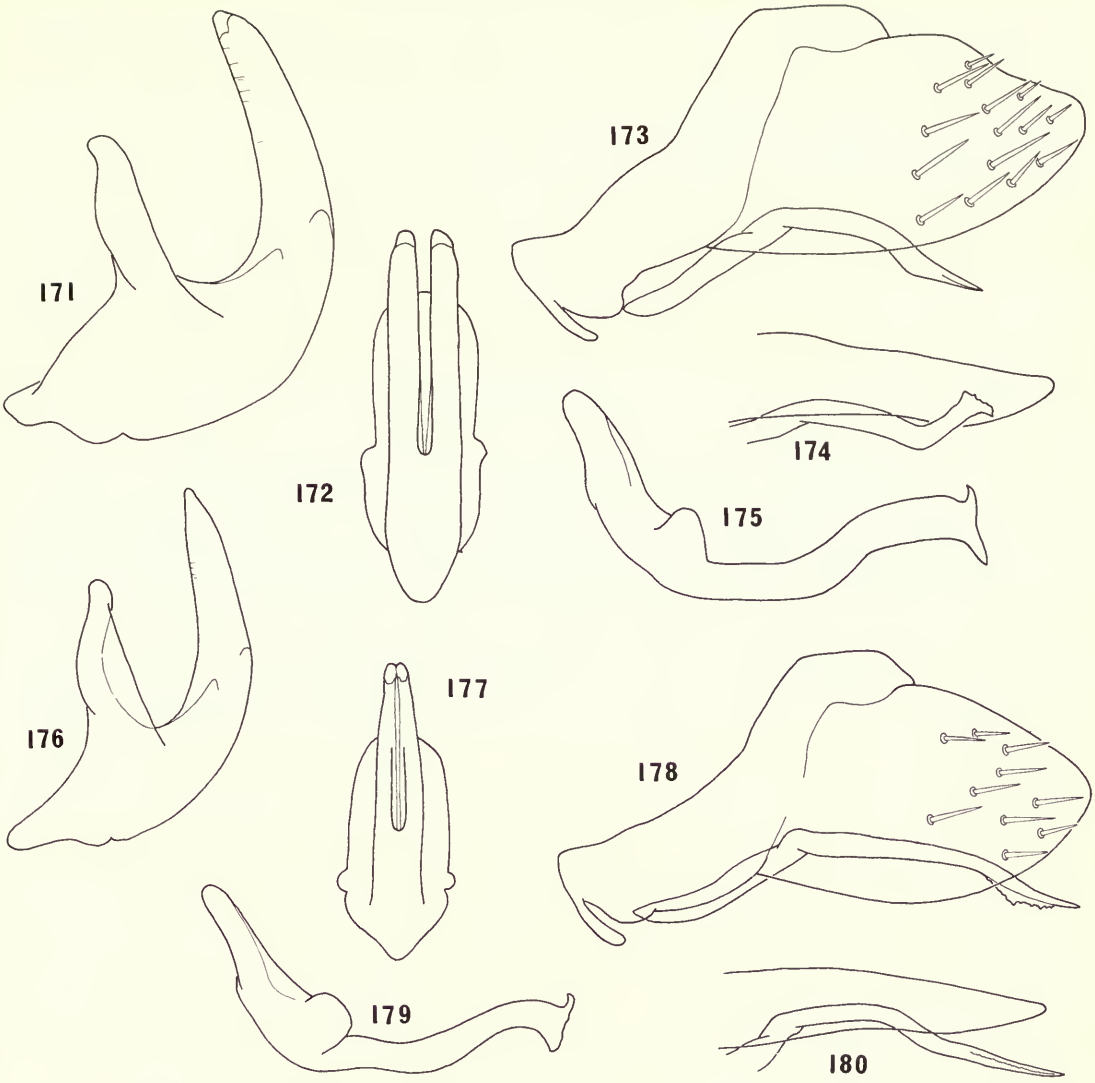
Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mountains, Budemu, 1220 m, 15–24.x.1964 (*M. E. Bacchus*) (BMNH).

Batracomorphus bacchusi sp. n.

(Figs 176–180)

Length: ♂, 4·48–4·64 mm (mean 4·51 mm).

Forewings paler than body and speckled with small dark brown spots.



Figs 171–180 171–175, *Batracomorphus circe*. (171, 172) aedeagus; (173) pygophore; (174) left pygophore lobe and process, ventral view; (175) style. 176–180, *B. bacchusi*. (176, 177) aedeagus; (178) pygophore; (179) style; (180) left pygophore lobe and process, ventral view. (For further explanation see 'Techniques and methods'.)

Male genitalia. Pygophore processes slender, directed posteriorly and turned slightly ventrally and mesally from midlength, apex acute, ventral margin acutely ridged and mildly serrate over apical third. Styles with apical process elongate, of uniform width, slightly sinuate from midlength, terminating in a short, acute, dorsally hooked process and a ventrally directed triangular expansion. Aedeagus simple; shaft directed dorsally; gonopore extending to just basad of midlength of shaft; anterior incision extending slightly more basad than gonopore.

Remarks. The subapical serrations on the ventral margin of the pygophore process is a character that is found in species from the Solomon Islands (*cybele*), Borneo (*sibyl* and *ilus*) and West Malaysia (*tithonus*) as well as elsewhere in New Guinea (*ares*). Apart from differences between all these species in the relative length and orientation of the pygophore processes, *bacchusi* differs from them all in the shape of the style. They also all (except *cybele*) lack the dark brown spots on the forewings. The shape of the style in *bacchusi* is similar to that in *circe* from New

Guinea, the differences between the two having been described under that species. The present species is known only from the Finisterre Mountains of New Guinea.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mountains, Moro, 1692 m, 30.x–15.xi.1964 (*M. E. Bacchus*) (BMNH).

Paratypes. **New Guinea**: 13 ♂, Papua New Guinea (BMNH).

Batracomorphus anubis sp. n.

(Figs 181–187)

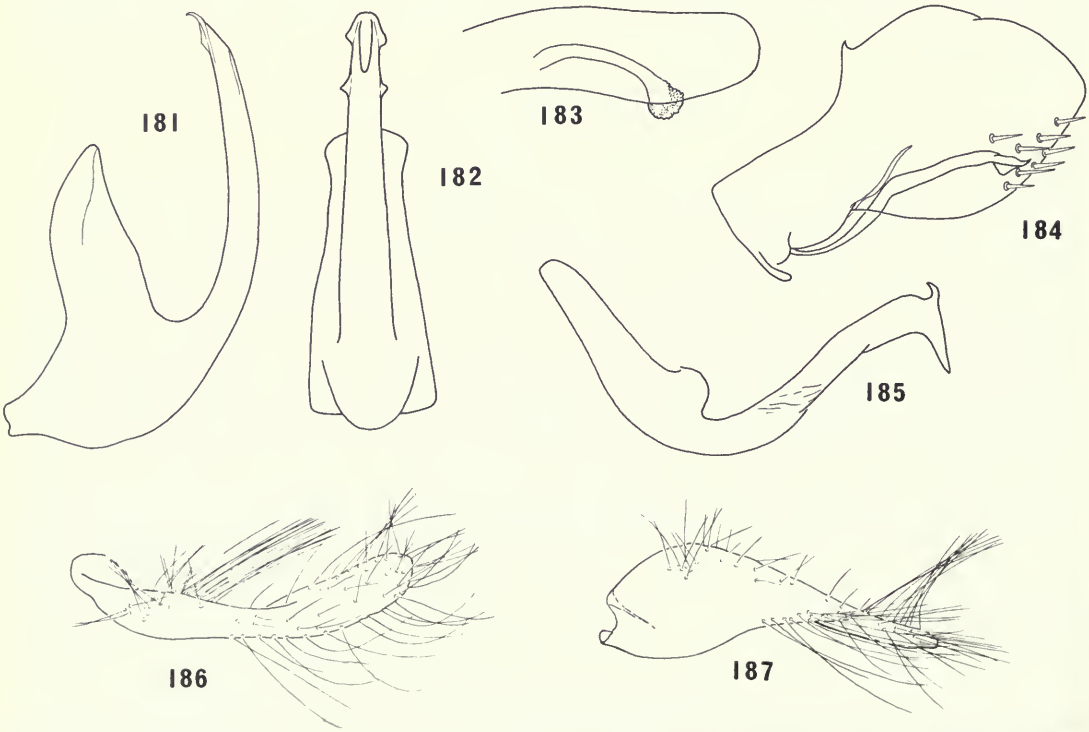
Length: ♂, 5·12 mm.

Colour reddish brown.

Vertex flat.

Male genitalia. Pygophore processes slender, directed posteriorly, apex turned medially and expanded plate-like with margin mildly serrate. Subgenital plates with basal stem absent; a uniseriate row of long hair-like setae along distal half of ventral margin and distal third of dorsal margin; a group of long hair-like setae near base of dorsal surface; lateral surface with short randomly scattered setae; medial surface devoid of setae. Styles with apical process slender, directed dorsoposteriorly, of uniform width in lateral aspect with lateral expansion at midlength in dorsal aspect, terminating in a short acute dorsally hooked process and a larger ventrally directed triangular process. Aedeagus simple; shaft slender, directed dorsally, slightly recurved anteriorly at apex, expanded slightly apically and also subapically as small lateral triangular projections; gonopore small, apical on posterior margin; anterior incision absent.

REMARKS. In addition to the flattened vertex, this species shows important differences from most in the shape of the subgenital plates, aedeagus and styles. The absence of a basal stem on the plates appears to be due to the basal extension of the lateral lobe, the remnants of the stem being



Figs 181–187 *Batracomorphus anubis*. 181, 182, aedeagus; 183, left pygophore lobe and process, ventral view; 184, pygophore; 185, style; 186, left subgenital plate, lateral view; 187, same, ventral view. (For further explanation see 'Techniques and methods'.)

visible within the existing plate. This development has been accompanied by the loss of setae on the medial surface. The shape of the style resembles that of *circe* and is clearly a modification of the normal condition, as are the subgenital plates. The aedeagus differs from normal in the absence of an anterior incision and the very short gonopore. The genitalia in general distinguish *anubis* from all others in the genus and its true affinities, especially as regards the aedeagus, are uncertain. The shape of the pygophore process suggests a possible relationship to those in which the apex is variously expanded, and the style resembles that in *circe* and *bacchusi* although this shape of style does occur in several other species.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Irian Jaya, Cyclops Mountains, Sabron, 366 m, 15.v.1936 (*L. E. Cheesman*) (BMNH).

Batracomorphus chryseis sp. n.

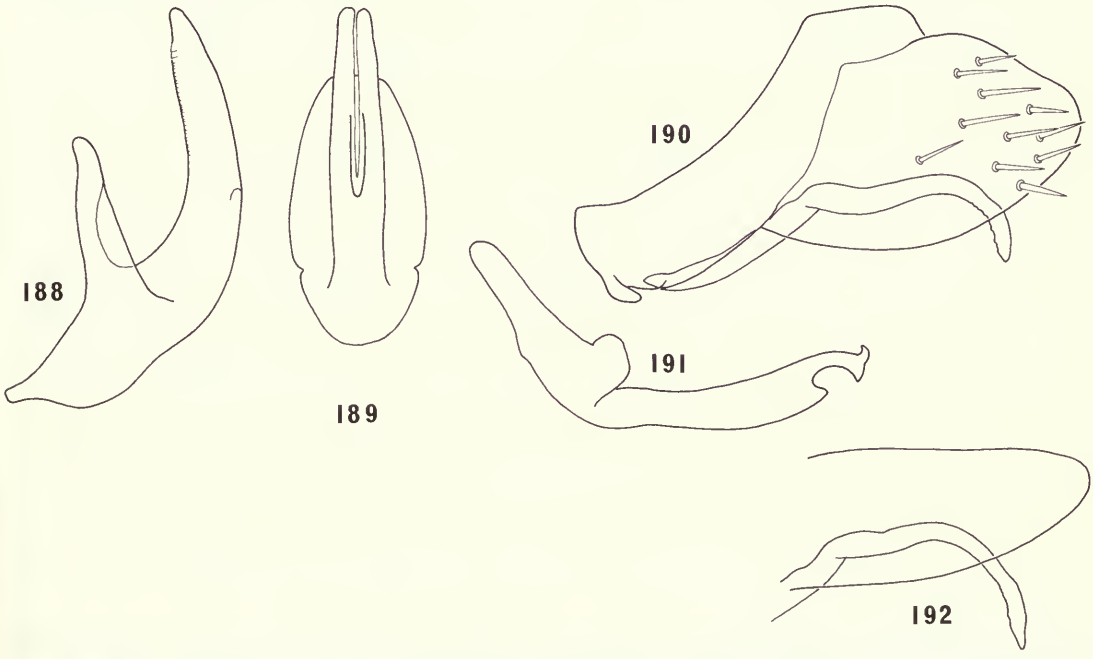
(Figs 188–192)

Length: ♂, 4·72–5·04 mm (mean 4·88mm).

Pronotum, scutellum and forewings speckled with small variably sized dark brown spots.

Male genitalia. Pygophore processes slender, directed posteriorly, turned mesally at midlength and curved ventrally with apex acute, ventral margin keeled subapically and slightly serrate. Styles with apical process expanded slightly over distal portion, abruptly narrowed near apex with ventral margin extending posteriorly as acute lobe; narrow subapical portion terminating in a small acute dorsally hooked process and a ventrally directed triangular expansion. Aedeagus simple; shaft directed dorsally; gonopore extending to just basad of midlength of shaft; anterior incision approximately equal in length to gonopore.

REMARKS. This species shows a slight resemblance to *cybele* from the Solomon Islands in the shape of the pygophore process but differs in having the process turned ventrally over its posterior half. It also differs from *cybele* in the shape of the style as well as having dark brown spots on the pronotum and scutellum as well as the forewings. The shape of the style is unusual in that the ventral margin is extended posteriorly to produce a distinctly concave subapical margin.



Figs 188–192 *Batracomorphus chryseis*. 188, 189, aedeagus; 190, pygophore; 191, style; 192, left pygophore lobe and process, ventrolateral view. (For further explanation see 'Techniques and methods'.)

MATERIAL EXAMINED

Holotype ♂, **New Britain**: Sio, N. coast, 600 m, 24.vii. 1956 (*E. J. Ford Jr*) (BPBM, Type No. 12,536).
Paratypes. **New Britain**: 1 ♂, 1 ♀ (BPBM).

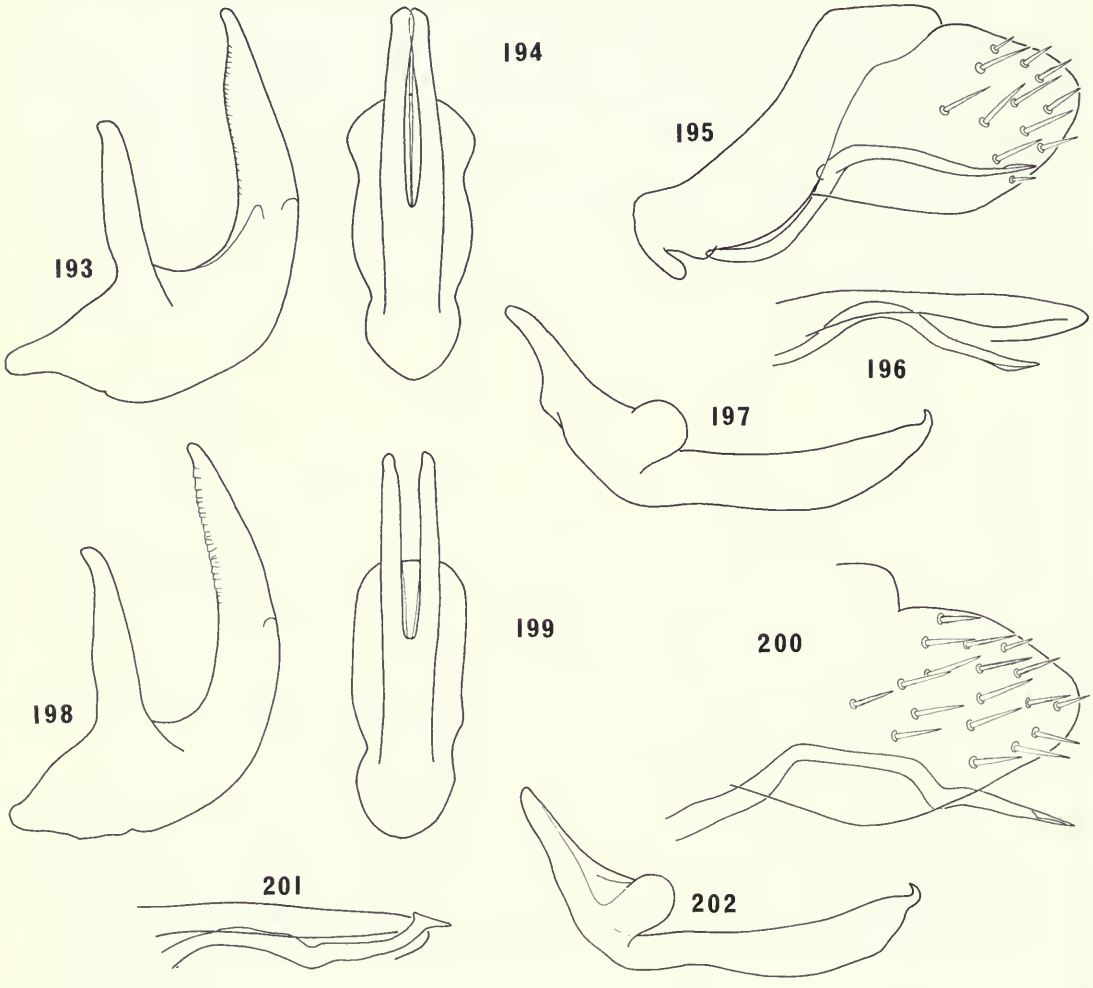
Batracomorphus torrevillasi sp. n.

(Figs 193–197)

Length: ♂, 4·40–4·72 mm (mean 4·53 mm).

Male genitalia. Pygophore processes slender, directed posteriorly, apex acute, a small lamellate expansion subapically on medial margin. Styles with apical process slightly expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, tapering to apex in lateral aspect; gonopore extending approximately two-thirds length of shaft; anterior incision equal in length to gonopore.

REMARKS. This species is similar to *priam* from the Philippines but is smaller, lacks the dark brown spots on the pronotum and forewings, and with the pygophore process relatively shorter, less sinuate, and with the subapical expansion medial rather than ventral.



Figs 193–202 193–197. *Batracomorphus torrevillasi*. (193, 194) aedeagus; (195) pygophore; (196) left pygophore lobe and process, ventral view; (197) style. 198–202, *B. memnon*. (198, 199) aedeagus; (200) pygophore lobe and process; (201) same, ventral view; (202) style. (For further explanation see 'Techniques and methods'.)

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Mindanao, Misamis OOr., Mt Balatukan, 15 km SW. of Gingoog, 1000–2000 m, 5.ii.1960 (*H. M. Torrevillas*) (BPBM, Type No. 12,537).

Paratypes. **Philippines**: 3 ♂, Luzon and Mindanao (BPBM).

Batracomorphus memnon sp. n.

(Figs 198–202)

Length: ♂, 4·72–5·04 mm (mean 4·88 mm).

Male genitalia. Pygophore processes slender, directed posteriorly, sinuate at midlength and turned laterally near apex, latter acute and turned posteriorly with a small acute lamellate expansion subapically on lateral margin. Styles with apical process expanded over distal half, tapering to small acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, tapering to apex in lateral aspect; gonopore extending to just basad of midlength of shaft; anterior incision approximately equal in length to gonopore.

REMARKS. This species is similar to *priam* from the Philippines but lacks the dark brown spots on the pronotum and forewings and has the pygophore processes more sinuate, turned laterally near apex and with the subapical expansion on the lateral rather than the ventral margin. It is known only from the Finisterre Mountains of New Guinea.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mountains, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

Paratypes. **New Guinea**: 5 ♂, Papua New Guinea (BMNH).

Batracomorphus cloelia sp. n.

(Figs 203–207)

Length: ♂, 4·56–5·20 mm (mean 4·89 mm).

Forewings sometimes speckled with very small dark brown spots.

Male genitalia. Pygophore processes slender, directed posteriorly, slightly sinuate, apex acute, with inner convolution visible subapically, rarely indistinct. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, tapering to apex in lateral aspect; gonopore extending approximately three-fourths length of shaft; anterior incision equal in length to gonopore.

REMARKS. This species is similar to *priam* from the Philippines but lacks the dark brown spots on the pronotum and usually also on the forewings. They differ also in the apex of the pygophore process, which in the present species is convoluted internally and lacks a subapical keel-like expansion, and in the degree of expansion of the apical process of the style. It is also similar to *tydeus* from the Solomon Islands but the latter species has a more slender aedeagus and the pygophore process more regularly sinuate and without inner convolutions subapically.

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Luzon, Benguet Subprovince, Baguio (*Baker*) (USNM).

Paratypes. **Philippines**: 18 ♂, 16 ♀, Luzon (BPBM, USNM).

Batracomorphus priam sp. n.

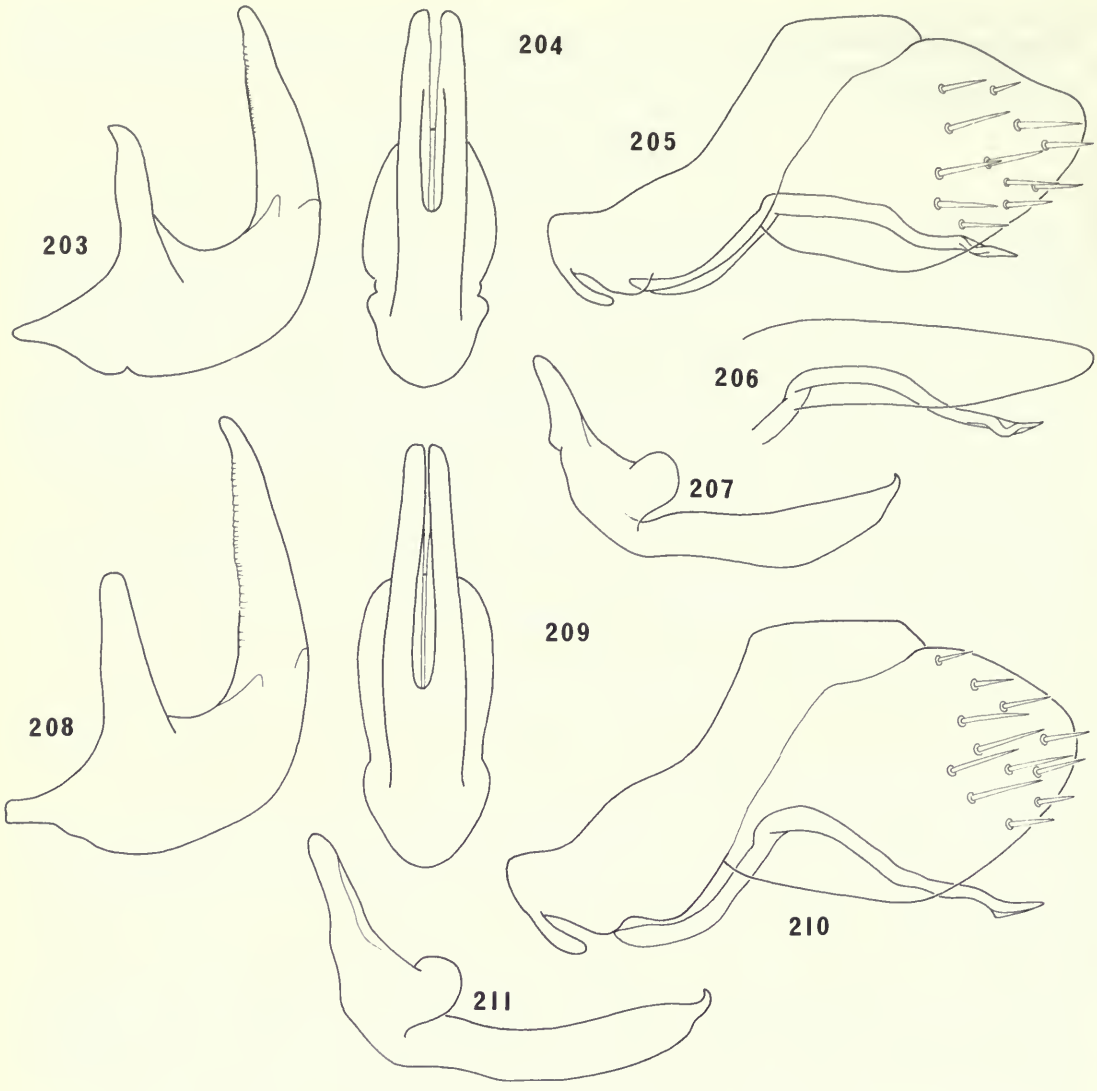
(Figs 208–211)

Length: ♂, 5·28 mm.

Pronotum and forewings speckled with very small dark brown spots.

Male genitalia. Pygophore processes slender, directed posteriorly and slightly ventrally, slightly sinuate, apex acute, ventral margin acutely ridged subapically. Styles with apical process not expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, tapering to apex in lateral aspect; gonopore extending approximately three-fourths length of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. This species is similar to *cloelia* from the Philippines but has a distinct keel-like



Figs 203–211 203–207, *Batracomorphus cloelia*. (203, 204) aedeagus; (205) pygophore; (206) left pygophore lobe and process, ventral view; (207) style. 208–211, *B. priam*. (208, 209) aedeagus; (210) pygophore; (211) style. (For further explanation see 'Techniques and methods'.)

expansion near the apex of the ventral margin of the pygophore process which also lacks the internal convolutions of the other species. They also differ in the shape of the apical process of the style which in *cloelia* is expanded over the distal half. The present species also resembles *tydeus* from the Solomon Islands but is much larger, has dark brown spots on the pronotum and forewings, the apical process of the style of uniform width, and the pygophore process less regularly sinuate and the ventral margin distinctly ridged subapically.

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Mindanao, Davao Province, E. slope of Mt Apo, Baclayan, 2348 m, xi.1946 (*H. Hoogstraal*) (FMNH).

Paratype. **Philippines**: 1 ♀, same data as holotype (FMNH).

Batracomorphus icarus sp. n.

(Figs 212–216)

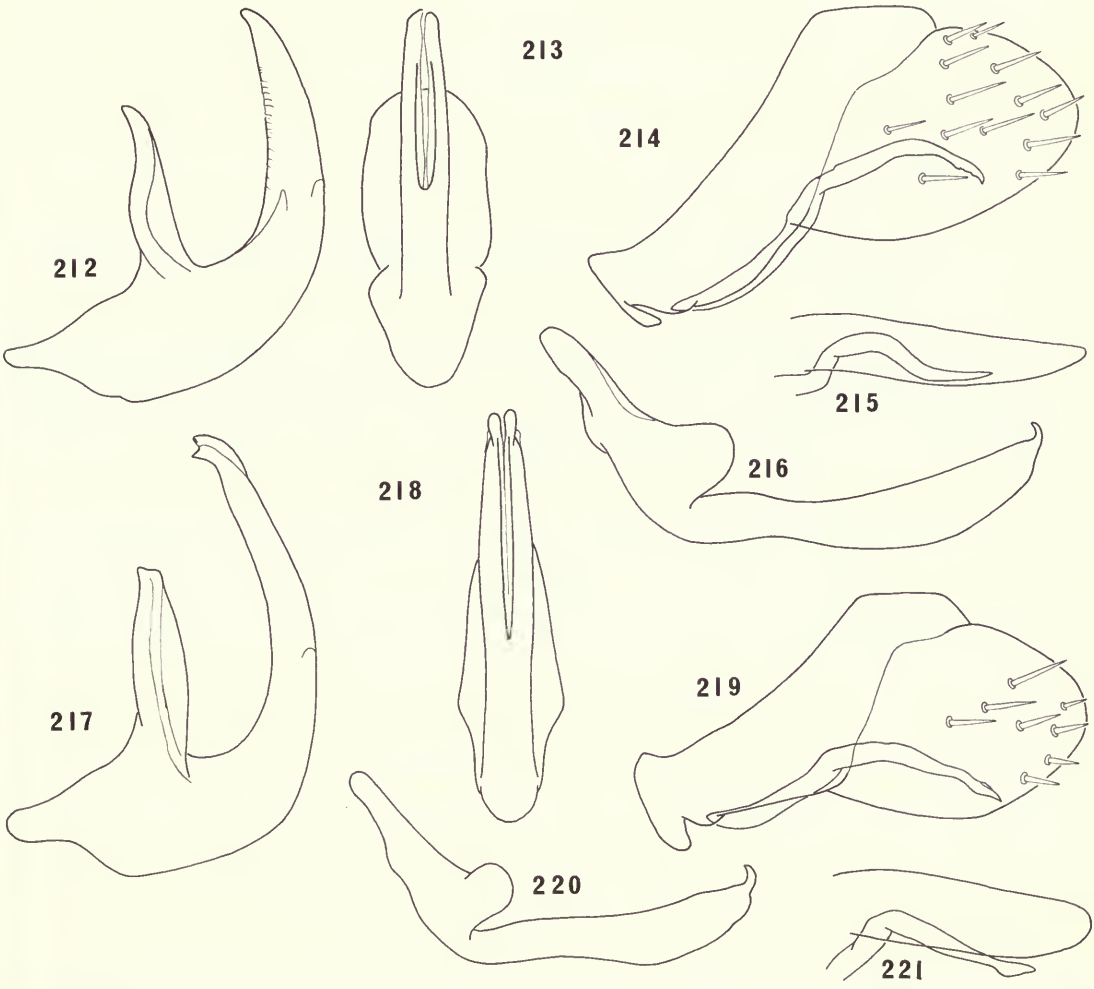
Length: ♂, 4·64 mm.

Male genitalia. Pygophore processes slender, directed dorsoposteriorly with distal half turned ventroposteriorly, apex acute, ventrolateral margin acuminate subapically. Styles with apical process expanded over distal half, tapering to short, acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, recurved anteriorly at apex; gonopore extending to slightly basad of midlength of shaft; anterior incision slightly longer than gonopore.

REMARKS. This species is similar to *proteus* from New Guinea but differs in having the aedeagus more robust basally, the pygophore process relatively shorter, the acuminate distal portion of the ventral margin less extensive and the apex directed posteriorly rather than posteromesally.

MATERIAL EXAMINED

Holotype ♂, **Australia**: N. Queensland, Kuranda, 13.iii.1956 (*J. L. Gressitt*) (BPBM, Type No. 12,538).



Figs 212–221 212–216, *Batracomorphus icarus*. (212, 213) aedeagus; (214) pygophore; (215) left pygophore lobe and process, ventral view; (216) style. 217–221, *B. camillus*. (217, 218) aedeagus (Sulawesi); (219) pygophore (Palawan); (220) style (Sulawesi); (221) left pygophore lobe and process (Palawan), ventrolateral view. (For further explanation see 'Techniques and methods'.)

Batracomorphus camillus sp. n.

(Figs 217–221)

Length: ♂, 3·92–4·64 mm (mean 4·24 mm).

Male genitalia. Pygophore processes slender, directed posteriorly and curving ventroposteriorly, apex acutely spatulate. Styles with apical process expanded over distal half, tapering to short, acute dorsally hooked apex. Aedeagus simple; shaft slender, directed dorsally, distal half curving anterodorsally with apex recurved anteriorly, a pair of very small thin triangular expansions on anterior margin at apex and a pair of slightly larger lobe-like expansions on posterior margin at apex; gonopore extending approximately two-thirds length of shaft; anterior incision extending to midlength of shaft or slightly less.

Remarks. This species is similar to *icarus* from Australia but differs in the aedeagus being more slender with apical expansions and the pygophore process being spatulate at the apex. It is also similar to *torrevillasi* from the Philippines in the shape of the pygophore process but differs from this species also in the shape of the aedeagus.

Material examined

Holotype ♂, **Sulawesi**: Minahassa, Tomohon, 30.vii.1954 (*A. H. G. Alston*) (BMNH).

Paratypes. **Philippines**: 7 ♂, 2 ♀, Luzon, Mindanao, Palawan and Tawi Tawi (BPBM, ZM).

Batracomorphus curvatus Linnavuori

(Figs 222–227)

Batrachomorphus curvatus Linnavuori, 1960*a*: 242. Holotype ♂, Palau Islands (FMNH) [examined].

Length: ♂, 4·40–5·12 mm (mean 4·68 mm).

Colour of vertex, pronotum and scutellum chestnut-brown, sometimes stramineous, scutellum usually darker than vertex and pronotum; face stramineous or yellowish brown; forewings translucent, whitish or pale stramineous, apex and narrow transverse band at midlength chestnut-brown, faintly so in males and more conspicuous in females.

Male genitalia. Pygophore processes slender, directed dorsally at base and curving ventroposteriorly, apex acute, medial margin acutely ridged subapically and sometimes expanded keel-like. Styles with apical process slender, elongate, slightly expanded over distal half, tapering to dorsally directed finger-like apex with slight constriction subapically. Aedeagus simple, expanded ventrally at base; shaft directed dorsally, recurved anteriorly over distal half; gonopore extending to approximately midlength of shaft; anterior incision extending approximately one-third length of shaft.

Remarks. This species differs from other known Pacific species in the shape of the aedeagus and style and resembles the Indian species *indicus*. Both show affinities with the African species in the shape of the aedeagus and styles. The single specimen from Borneo has the pygophore processes more strongly arched with the apex directed ventrally. The styles are also less constricted subapically with the finger-like apex relatively shorter and the subapical prominence on the ventral margin acute. It is possible that this is a new species.

Distribution. Borneo*, Java*, Palau, Philippines* (* new records).

Material examined

Batrachomorphus curvatus Linnavuori, holotype ♂, **Palau Islands**: Peleliu Island, 1.viii.1945 (*H. S. Dybas*) (FMNH).

Borneo: 1 ♂, Sabah (BPBM). **Java**: 1 ♂ (ITZ). **Palau Islands**: 2 ♂, 2 ♀, Babelthuap and Koror Palau (USNM). **Philippines**: 20 ♂, 10 ♀, Leyte, Luzon, Mindanao, Negros and Panay (AMNH, BPBM, FMNH, USNM).

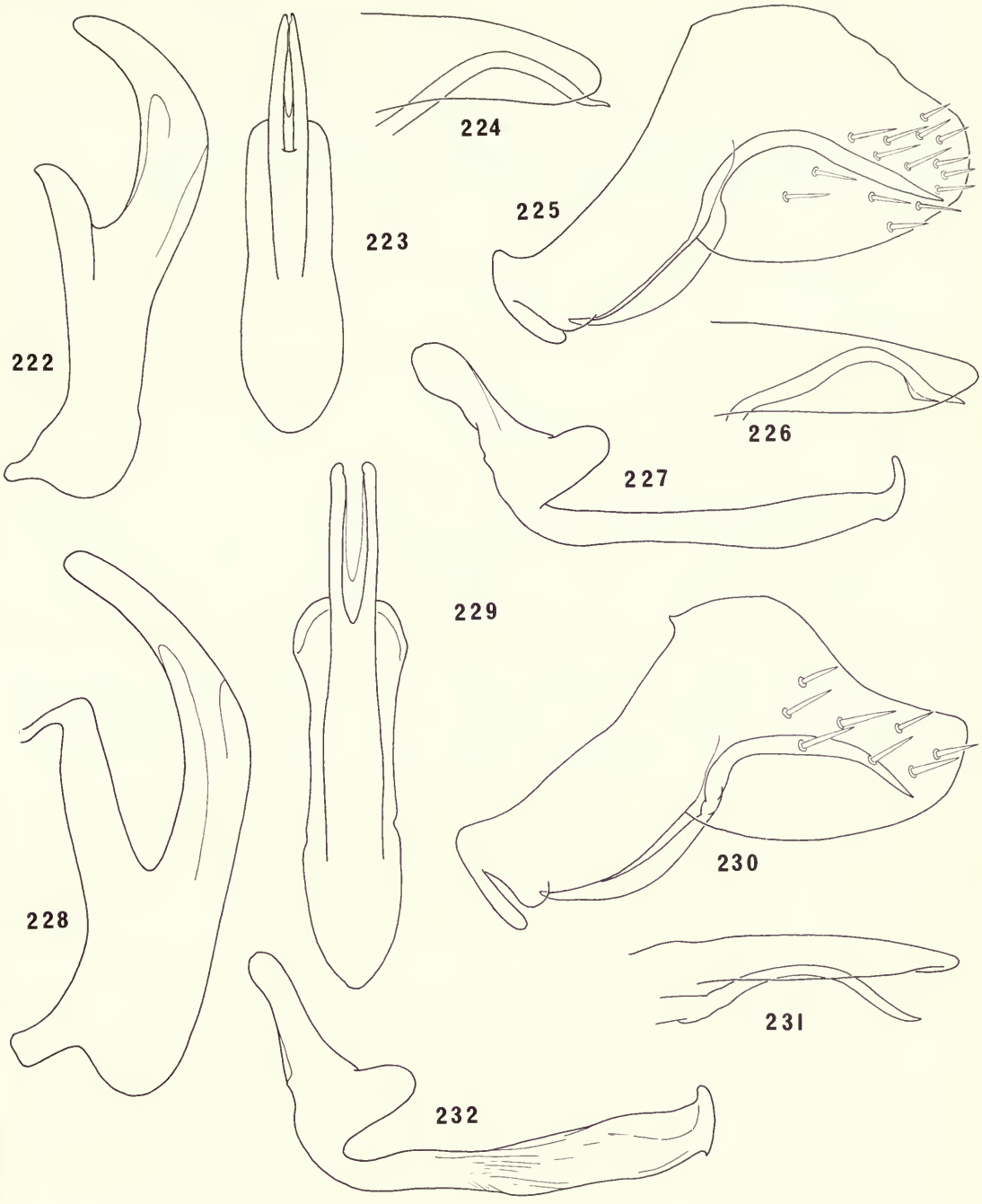
Batracomorphus indicus (Lethierry)

(Figs 228–232)

Macropsis indica Lethierry, 1892: 209. Holotype ♂, India (MNHN) [examined].

Length: ♂, 4·08 mm.

Male genitalia. Pygophore with lateral lobe narrowing to apex, processes slender, elongate, directed posteriorly and curving ventromesally, apex acute. Styles with apical process laterally compressed,



Figs 222–232 222–227, *Batracomorphus curvatus*. (222, 223) aedeagus; (224) left pygophore lobe and process (Philippines), ventrolateral view; (225) pygophore; (226) left pygophore lobe and process (Palau), ventrolateral view; (227) style. 228–232, *B. indicus* (holotype). (228, 229) aedeagus; (230) pygophore; (231) left pygophore lobe and process, ventral view; (232) style. (For further explanation see 'Techniques and methods'.)

blade-like, increasing in width towards apex in lateral aspect, terminating in short, dorsally directed, finger-like process with a small spur-like projection subapically on ventral margin. Aedeagus simple, expanded ventrally at base; shaft elongate, directed dorsally and recurved anteriorly at midlength; gonopore extending to near midlength of shaft; anterior incision extending approximately one-third length of shaft.

REMARKS. This species has been widely recorded from India to Flores, although its presence in the Pacific area was not confirmed by the present study. It is closely related to *curvatus* but differs mainly in the shape of the style and aedeagus as well as in coloration. The shape of the style is unknown amongst the Pacific species and is similar to that present in the African species to which both *indicus* and *curvatus* show affinities.

DISTRIBUTION. Burma, Sri Lanka, China, Flores, India, Krakatau, Lombok, Seychelles, Sumbawa.

MATERIAL EXAMINED

Macropsis indica Lethierry, holotype ♂, **India**: Mahé (MNHN).

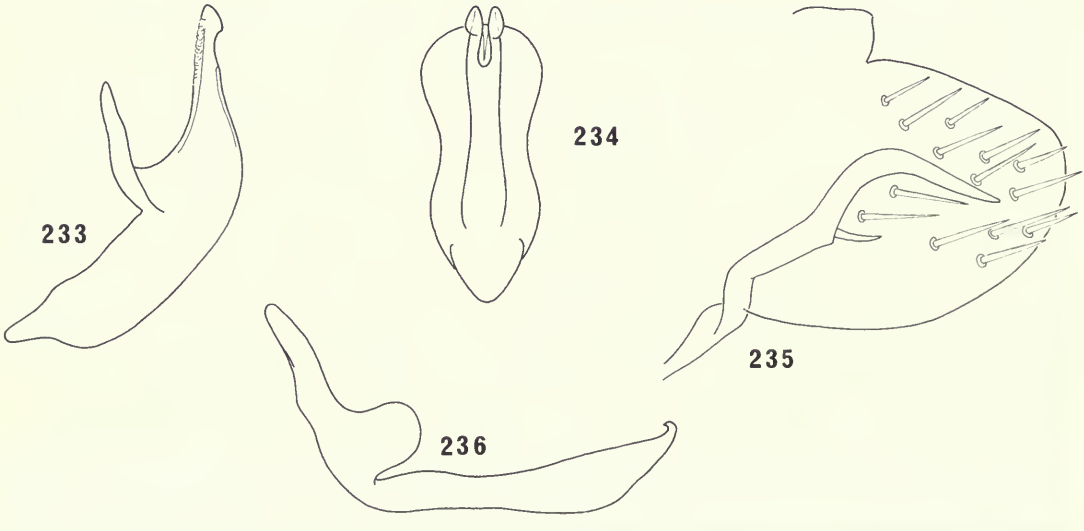
***Batracomorphus daedalus* sp. n.**

(Figs 233–236)

Length: ♂, 4·88 mm.

Male genitalia. Pygophore processes elongate, directed dorsoposteriorly over basal one-third then abruptly arched dorsally, apex directed ventroposteriorly, acute, a short posteriorly directed spine-like projection on ventral margin at proximal end of arched portion. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple, robust; shaft short, directed dorsally, tapering to apex in lateral aspect and terminating in a pair of small laterally directed lobes; gonopore extending approximately one-fourth length of shaft; anterior incision equal in length to gonopore.

REMARKS. Although lamellate and lobe-like expansions of the aedeagus are present in several species, the robust nature of the aedeagus in the present species, the relative length of the gonopore and anterior incision, and the orientation of the apical lobes are all unique. It shows certain similarities to *caeneus* from West Malaysia and Borneo but differs in having a more robust aedeagus, a strongly arched pygophore process and a strongly expanded apical process on the style.



Figs 233–236 *Batracomorphus daedalus*. 233, 234, aedeagus; 235, pygophore lobe and process; 236, style. (For further explanation see 'Techniques and methods'.)

MATERIAL EXAMINED

Holotype ♂, **Sulawesi**: Soputan Masif, near Kelelond, 14–19.vi.1954 (*A. H. G. Alston*) (BMNH).

Batracomorphus tydeus sp. n.

(Figs 237–240)

Length: ♂, 4·00–4·16 mm (mean 4·08 mm).

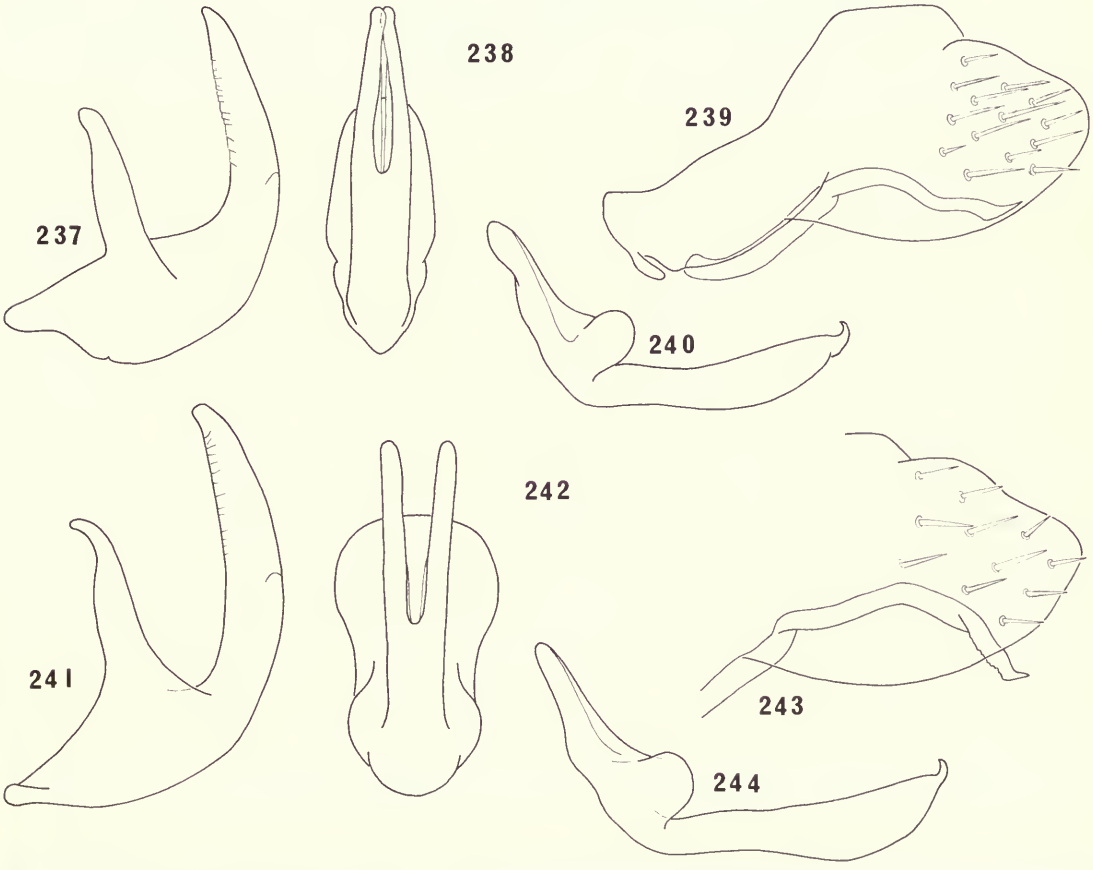
Male genitalia. Pygophore processes slender, slightly sinuate, directed posteriorly and slightly ventrally, apex acute. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally; gonopore extending to just basad of midlength of shaft; anterior incision approximately same length as gonopore.

REMARKS. This species is similar to the Philippine *cloelia* and *priam* but is smaller than either and lacks the dark brown spots present on the pronotum and forewings of *priam*, and sometimes present on the forewings of *cloelia*. It also differs in having the pygophore process relatively shorter and more regularly sinuate and lacking the internal convolutions of *cloelia* and the subapical ventral ridge of *priam*.

MATERIAL EXAMINED

Holotype ♂, **Solomon Islands**: Guadalcanal, Honiara, 4–8.x.1953 (*J. D. Bradley*) (BMNH).

Paratypes. **Solomon Islands**: 5 ♂, 2 ♀, Santa Ysabel (BPBM).



Figs 237–244 237–240, *Batracomorphus tydeus*. (237, 238) aedeagus; (239) pygophore; (240) style. 241–244, *B. proteus*. (241, 242) aedeagus; (243) pygophore lobe and process; (244) style. (For further explanation see 'Techniques and methods'.)

Batracomorphus proteus sp. n.

(Figs 241–244)

Length: ♂, 4·96 mm.

Male genitalia. Pygophore processes slender, directed posteriorly, curving ventrally from midlength, sinuate in ventral aspect with apex directed posteromesally, ventral margin acuminate over distal one-fourth, apex acute. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally; gonopore extending to midlength of shaft; anterior incision equal in length to gonopore.

Remarks. This species is similar to *icarus* from Australia but differs in having the pygophore processes relatively longer, the acuminate distal portion of the ventral margin more extensive and the apex directed posteromesally rather than posteriorly.

Material examined

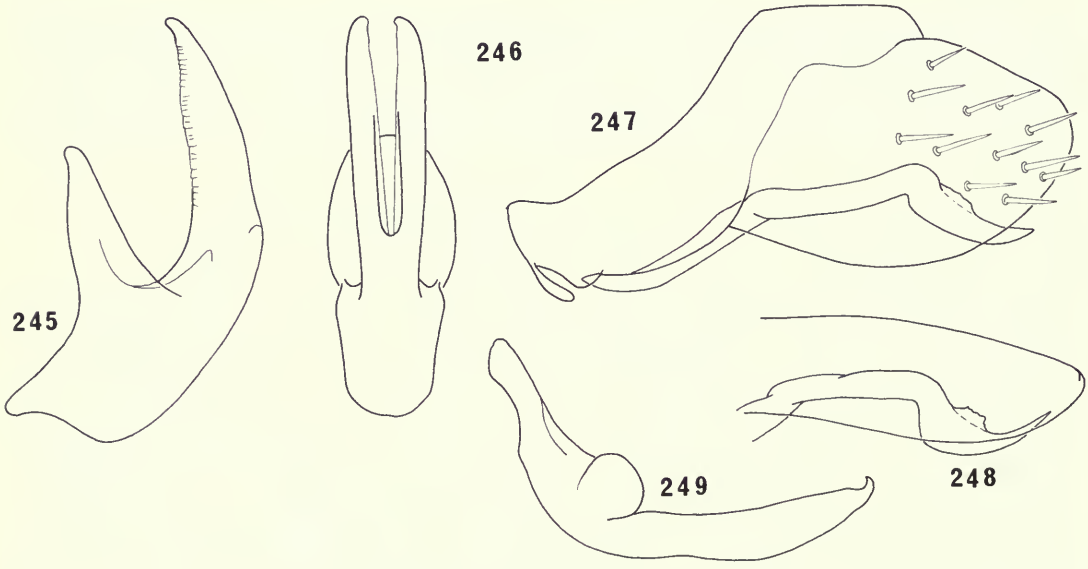
Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mountains, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

Batracomorphus ganymede sp. n.

(Figs 245–249)

Length: ♂, 4·64–4·80 mm (mean 4·72 mm).

Male genitalia. Pygophore processes elongate, directed posteriorly over basal half, turned abruptly mesally at midlength and expanded into robust claw-like distal half tapering to acute laterally curving apex, upper concave margin of claw sometimes with small lamellate expansion basally. Styles with apical process slightly expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, tapering in lateral aspect to anteriorly recurved apex; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.



Figs 245–249 *Batracomorphus ganymede*. 245, 246, aedeagus; 247, pygophore; 248, left pygophore lobe and process, ventrolateral view; 249, style. (For further explanation see 'Techniques and methods'.)

Remarks. This species is similar to *latona* from Australia but has a more robust pygophore process with its distal half expanded claw-like. It is known only from the Finisterre Mountains of New Guinea.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mountains, Moro, 1692 m, 30.x–15.xi.1964 (*M. E. Bacchus*) (BMNH).

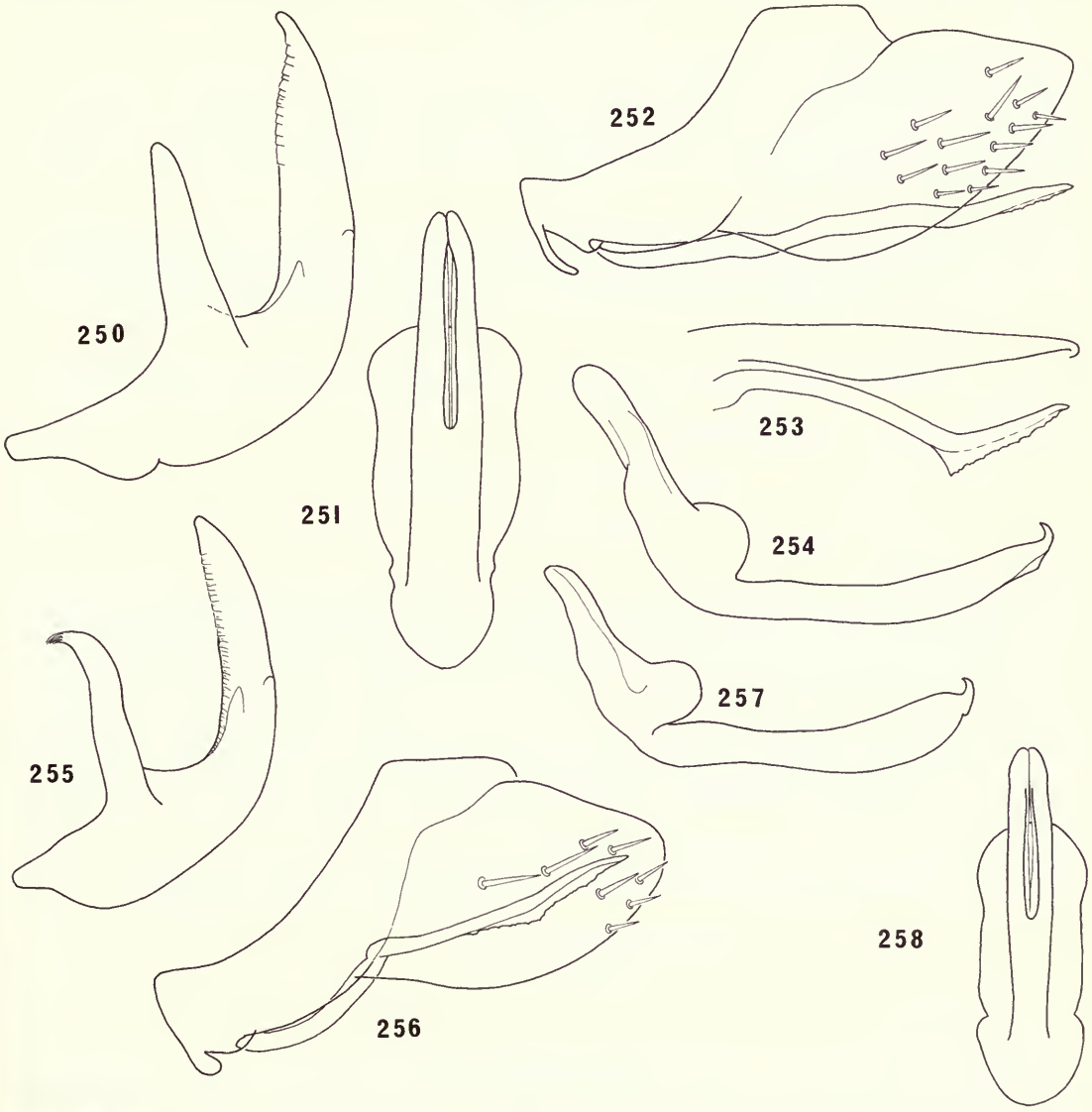
Paratype. **New Guinea**: 1 ♂, Papua New Guinea (BMNH).

Batracomorphus ares sp. n.

(Figs 250–254)

Length: ♂, 5·44 mm.

Male genitalia. Pygophore processes slender, directed posteromesally over basal two-thirds then turned abruptly posteriorly, distal one-third with mesal margin acutely ridged and weakly serrate, apex acute. Styles with apical process not expanded over distal half, tapering to short acute dorsally hooked apex, ventral margin acutely ridged subapically. Aedeagus simple; shaft directed dorsally, tapering in lateral



Figs 250–258 250–254, *Batracomorphus ares*. (250, 251) aedeagus; (252) pygophore; (253) left pygophore lobe and process, ventral view; (254) style. 255–258, *B. ilus*. (255) aedeagus; (256) pygophore; (257) style; (258) aedeagus. (For further explanation see 'Techniques and methods'.)

aspect to anteriorly recurved apex; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. This species is similar to *ilus* from Borneo but is larger, has the aedeagus more robust with the shaft more tapered apically, the pygophore processes angled along their length rather than straight with the acuminate margin less extensive, and the apical process of the style of uniform width in lateral aspect. Both species are related to *procris* and *elissa* from Malaya and New Guinea respectively.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Morobe District, Edie Creek, 2135 m, 17.ix.1964 (*M. E. Bacchus*) (BMNH).

Batracomorphus ilus sp. n.

(Figs 255–258)

Length: ♂, 4·32–4·56 mm (mean 4·41 mm).

Male genitalia. Pygophore processes slender, straight, directed dorsoposteriorly, apex acute, ventral margin over distal half keeled and slightly serrate. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex, a small subapical prominence on ventral margin. Aedeagus simple; shaft directed dorsally; gonopore extending to just basad of midlength of shaft; anterior incision very slightly longer than gonopore.

REMARKS. This species is similar to *ares* from New Guinea but is smaller with the pygophore processes relatively shorter, straight rather than angled and with the acuminate ventral margin extending more basad. The aedeagus of the present species is also less robust and the apical process of the style expanded over its distal half. It is known only from the type-locality.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, Tawau, Quoin Hill, 3–7.vii.1962 (*H. Holtmann*) (BPBM, Type No. 12,539).

Paratypes. **Borneo**: 3 ♂, Sabah (BPBM).

Batracomorphus procris sp. n.

(Figs 259–262)

Length: ♂, 5·04 mm.

Male genitalia. Pygophore processes slender, directed posteriorly, expanded slightly distad of midlength and tapering to acute apex, dorsal or dorsolateral margin over apical one-fourth acuminate and slightly serrate. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex, with small lamellate expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally; gonopore extending to just basad of midlength of shaft; anterior incision approximately equal in length to gonopore.

REMARKS. This species is similar to *ilus* from Borneo but is larger and has the pygophore processes less extensively acuminate subapically and on the dorsal rather than the ventral margin.

MATERIAL EXAMINED

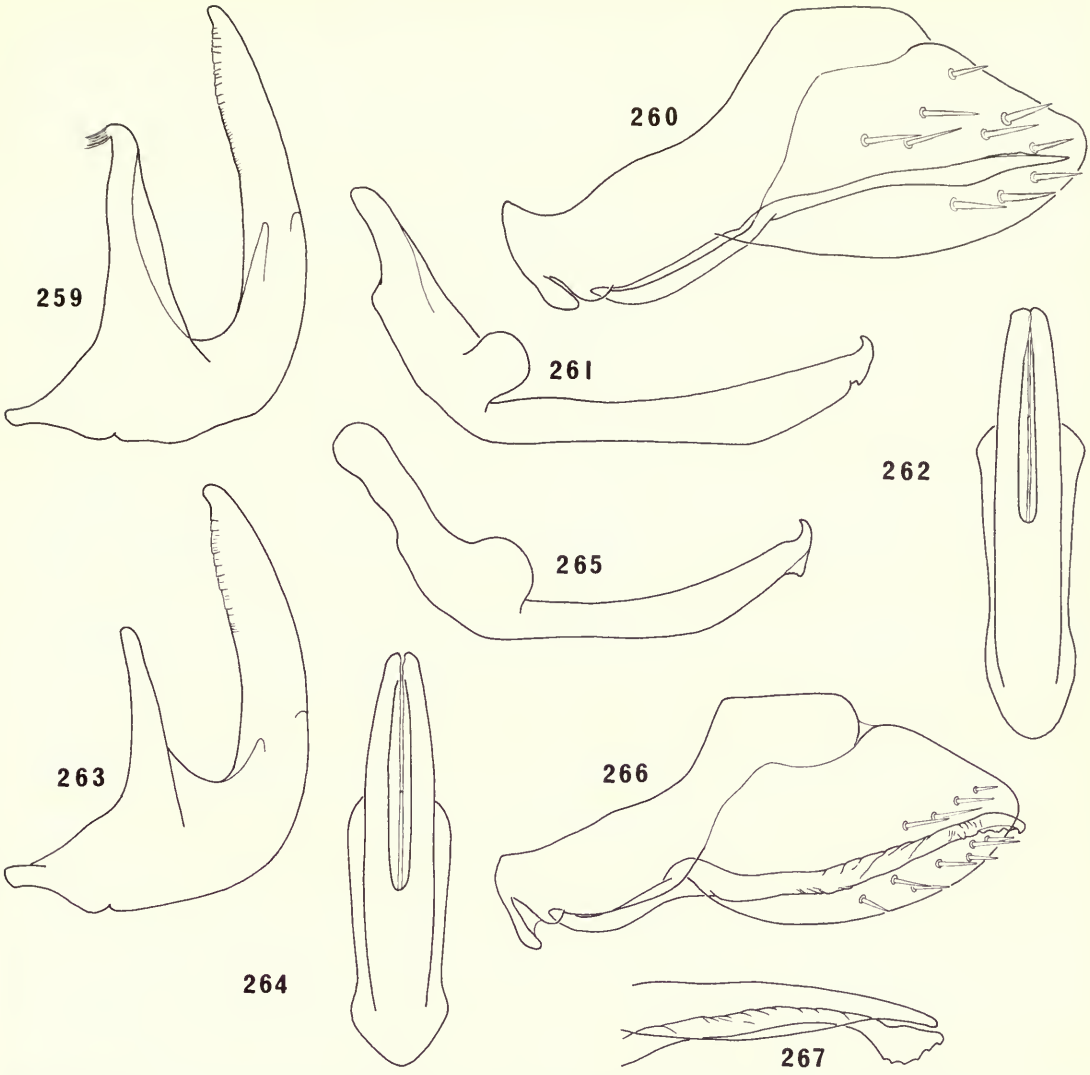
Holotype ♂, **West Malaysia**: Pahang, near Karak, Chintamani, jungle, 20.viii.1935 (BMNH).

Batracomorphus elissa sp. n.

(Figs 263–267)

Length: ♂, 6·08 mm.

Male genitalia. Pygophore processes elongate, directed posteriorly and slightly dorsally, transversely and obliquely wrinkled along their length, apex spatulate and turned mesally with mesal margin serrate. Styles with apical process very slightly expanded distad of midlength, tapering to short acute dorsally hooked apex; a small triangular lamellate expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally; gonopore extending approximately three-fourths length of shaft; anterior incision extending slightly more basad than gonopore.



Figs 259–267 259–262, *Batracomorphus procris*. (259) aedeagus; (260) pygophore; (261) style; (262) aedeagus. 263–267, *B. elissa*. (263, 264) aedeagus; (265) style; (266) pygophore; (267) left pygophore lobe and process, ventral view. (For further explanation see 'Techniques and methods'.)

Remarks. This species is unusually long and slender in appearance. It is similar to *ares* from New Guinea but differs in having the pygophore processes more lineate, wrinkled rather than smooth, and spatulate rather than acute apically.

Material examined

Holotype ♂, **New Guinea**: Papua New Guinea, Wau, Mt Kaindi, 2360 m, 18.ix.1972 (*J. v. d. Vecht*) (ITZ).

Batracomorphus sibyl sp. n.

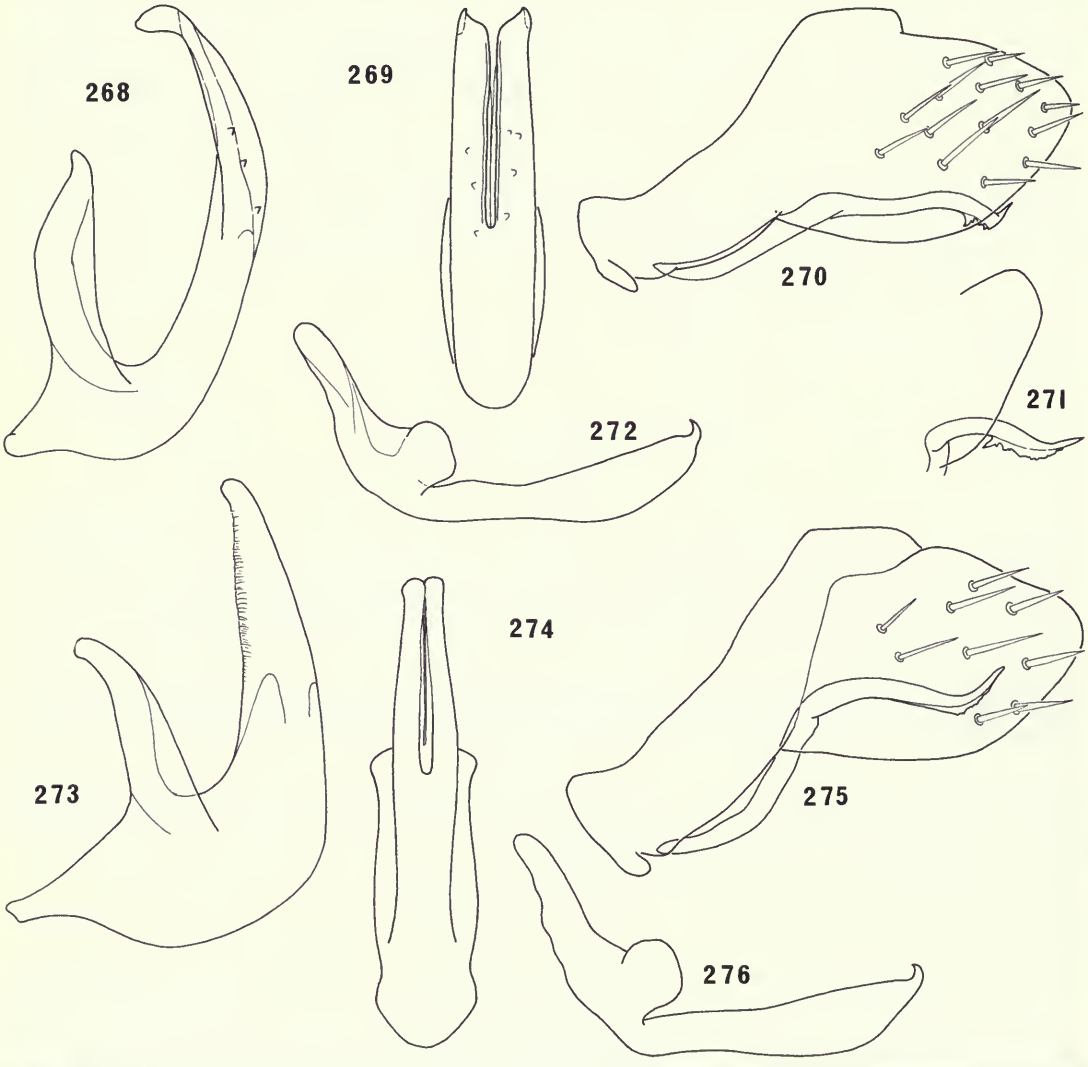
(Figs 268–272)

Length: ♂, 4·72–5·04 mm (mean 4·91 mm).

Male genitalia. Pygophore processes slender, directed posteriorly with apical half turned posteromesally, apex acute, ventral margin acuminate and irregularly serrate over apical third. Styles with apical process

expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus with shaft directed dorsally and curving anterodorsally over distal half, slender, becoming anteroposteriorly compressed over distal half and terminating in a pair of short anteriorly directed lateral lobes; posterior margin extending keel-like on each side of gonopore over distal half of shaft and with a row of 3–4 small tubercles on each side of gonopore over its basal half; gonopore extending to near midlength of shaft; anterior incision equal in length to gonopore.

Remarks. This species resembles several others in different aspects of the male genitalia but is readily distinguished from them all. The pygophore process is similar to that in *tithonus* from West Malaysia but is relatively longer and turned mesally. They differ also in the aedeagus which is of the simple basic shape in the West Malaysian species. The aedeagus of the present species is similar to that of *protesilaus* from Borneo in being anteroposteriorly compressed distally and having small tubercles on the posterior margin, but differs in being recurved, having apical lobes and a distinct keel on each side of the gonopore. The two species also differ in the shape of the pygophore process which is relatively simple in *protesilaus*. The anteriorly recurved shaft of the



Figs 268–276 268–272, *Batracomorphus sibyl.* (268, 269) aedeagus; (270) pygophore; (271) left pygophore lobe and process, posterolateral view; (272) style. 273–276, *B. tithonus*. (273, 274) aedeagus; (275) pygophore; (276) style. (For further explanation see 'Techniques and methods'.)

aedeagus and the keels bordering the gonopore in the present species are characters which are present also in *teucer* from the Philippines, Borneo and West Malaysia. These two species are also similar in having the pygophore processes turned mesally at the apex, but differ in the shape of the apical expansions on the process as well as the presence of posterior tubercles and apical lobes on the aedeagus of the present species which, in addition, lacks the subapical expansions of the aedeagus present in *teucer*. The present species is known only from the type-locality.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sarawak, Mt Dulit, 1220 m, moss forest, 27.x.1932 (*B. M. Hobby & A. W. Moore*) (BMNH).

Paratypes. **Borneo**: 5 ♂, 4 ♀, Sarawak (BMNH).

***Batracomorphus tithonus* sp. n.**

(Figs 273–276)

Length: ♂, 4·24 mm.

Colour of head, pronotum and scutellum brownish, forewings stramineous.

Male genitalia. Pygohore processes slender, directed posteriorly, apex acute and turned dorsoposteriorly, ventral margin acuminate and expanded keel-like over distal third. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, tapering to apex in lateral aspect; gonopore extending to just basad of midlength of shaft; anterior incision equal in length to gonopore.

REMARKS. This species is similar to *sibyl* from Borneo in the shape of the pygophore processes but differs in the processes being relatively shorter and not turned posteromesally over their distal half. They also differ in the shape of the aedeagus which is of the simple basic type in the present species.

MATERIAL EXAMINED

Holotype ♂, **West Malaysia**: Negri Sembilan, Port Dickson, 5.i.1935 (*H. M. Pendlebury*) (BMNH).

***Batracomorphus juturna* sp. n.**

(Figs 277–281)

Length: ♂, 4·72–4·96 mm (mean 4·83 mm).

Male genitalia. Pygophore processes slender, directed posteriorly and slightly dorsally over basal half and turned slightly ventrally at midlength, slightly expanded on medial margin approximately one-third distance from apex with lateral or ventrolateral margin acutely ridged over distal third, apex acute. Styles with apical process slightly expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft slender, directed dorsally; gonopore extending to near midlength of shaft; anterior incision approximately equal in length to gonopore.

REMARKS. This species resembles *ganymede* from New Guinea but differs in having the apical portion of the pygophore process less robust, the shaft of the aedeagus more slender and upright and the gonopore and anterior incision relatively shorter. It strongly resembles *pictus* from New Guinea in the shape of the pygophore processes but is much smaller, lacks the dark brown markings on the dorsal surface, and differs also in the shape of the style and aedeagus. It is known only from the type-locality.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, Tawau, Quoin Hill, 3–7.vii.1962 (*H. Holtmann*) (BPBM, Type No. 12,540).

Paratypes. **Borneo**: 5 ♂, Sabah (BPBM).

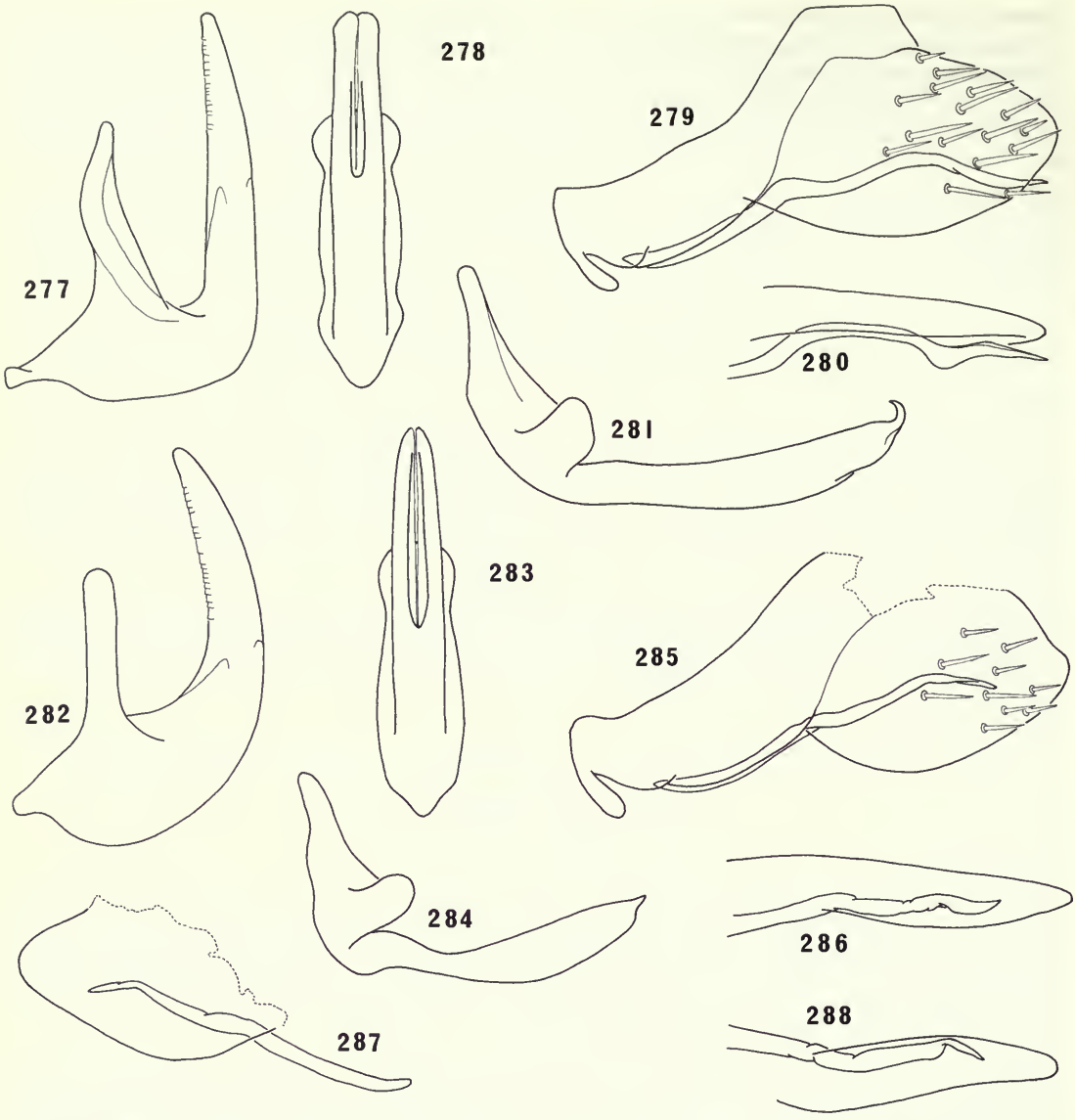
***Batracomorphus viridoflavidus* (Metcalf)**

(Figs 282–288)

Bythoscopus viridoflavidus Metcalf, 1946: 136. Holotype ♂, GUAM (BPBM) [examined].

Length: ♂, 4·5 mm.

Male genitalia. Pygophore processes slender, directed dorsoposteriorly with apical third turned post-



Figs 277–288 277–281, *Batracomorphus juturna*. (277, 278) aedeagus; (279) pygophore; (280) left pygophore lobe and process, ventral view; (281) style. 282–288, *B. viridoflavidus* (holotype). (282, 283) aedeagus; (284) style; (285) pygophore; (286) left pygophore lobe and process, ventral view; (287) right pygophore lobe and process, right lateral view; (288) same, ventral view. (For further explanation see 'Techniques and methods'.)

eriorly, apex acute. Styles with apical process strongly expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft slender, directed dorsally and curving slightly anterodorsally from midlength; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.

Remarks. This species, described originally from Guam, was recorded by Linnavuori (1960*a*) from throughout the Caroline Islands. His illustrations, however, indicate that he misidentified this species and that he may have had *silvanus* instead. The only available specimen of *viridoflavidus*, the holotype, shows differences between the left and right pygophore process, that on the left appearing to be more fully developed. The condition of the pygophore processes

suggests that this specimen may be teneral although it shows insufficient resemblance to other known species, especially *atrifrons* and *evander* from Guam, to confirm this.

DISTRIBUTION. East Caroline Atolls, Guam, Kusaie, Palau, Ponape, Saipan, Truk, Yap.

MATERIAL EXAMINED

Bythoscopus viridoflavidus Metcalf, holotype ♂, **Guam**: Mt Alifan, 21.v.1936 (*O. H. Swezey*) (BPBM).

Batracomorphus pictus Blöte

(Figs 289–293)

Batrachomorphus pictus Blöte, 1964: 470. Holotype ♂, NEW GUINEA (RNH) [examined].

Length: ♂, 7·0 mm.

Vertex with a large dark brown triangle on each side of midline with a small dark brown spot between each triangle and eye; pronotum with a broad longitudinal band on each side of midline and a series of markings along anterior margin, brown; scutellum brown except midline and anterolateral margins; forewings, except clavus, irregularly mottled with irregularly shaped dark brown marks.

Male genitalia. Pygophore processes slender, directed dorsoposteriorly over basal half, turned posteromesally immediately distad of midlength and then posteroventrally over apical one-fourth, the latter slightly expanded basally and tapering to acute apex, its ventrolateral margin acutely ridged distally and expanded flange-like. Subgenital plates normal as in *harpago* but with lateral margin smoothly rounded to base, basal stem indistinct. Styles with apical process long and slender, of approximately uniform width throughout length, tapering distally to short acute dorsally hooked apex; a large keel-like expansion subapically on ventral margin, its edge mildly serrate. Aedeagus simple, its base expanded ventrally; shaft directed dorsally; gonopore extending to approximately midlength of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. This species is one of four (*pictus, theseus, cheesmanae* amd *cossus*) characterised by the ventral prolongation of the base of the aedeagus and a slender elongate apical process on the style. All four occur in New Guinea and in the case of *cheesmanae* also in New Britain. A tendency towards the ventral prolongation of the aedeagus is seen in certain other New Guinea species (*laertes, portunus, rhea, daunus, numa* and *virbius*) but they all differ from those in the present group by having a more normally shaped apical process on the style. The subgenital plates in the present species differ from normal in lacking a distinct basal stem. This is due to the extension of the lateral margin basally, thereby enclosing the stem which is still visible within the basal membranes of the plate. This condition is illustrated in Fig. 187 for *anubis* in which a similar development has occurred. A similar 'loss' of the basal stem has occurred in the species *acestes* (p. 162) to *cycnus* (p. 177) and in *lentiginosus, dymas* and *remus* although accompanied in their case by the actual loss of either the dorsal or ventral row of setae.

DISTRIBUTION. New Guinea.

MATERIAL EXAMINED

Batrachomorphus pictus Blöte, holotype ♂, **New Guinea**: Araboebivak, 9.x.1939 (RNH).

Batracomorphus theseus **sp. n.**

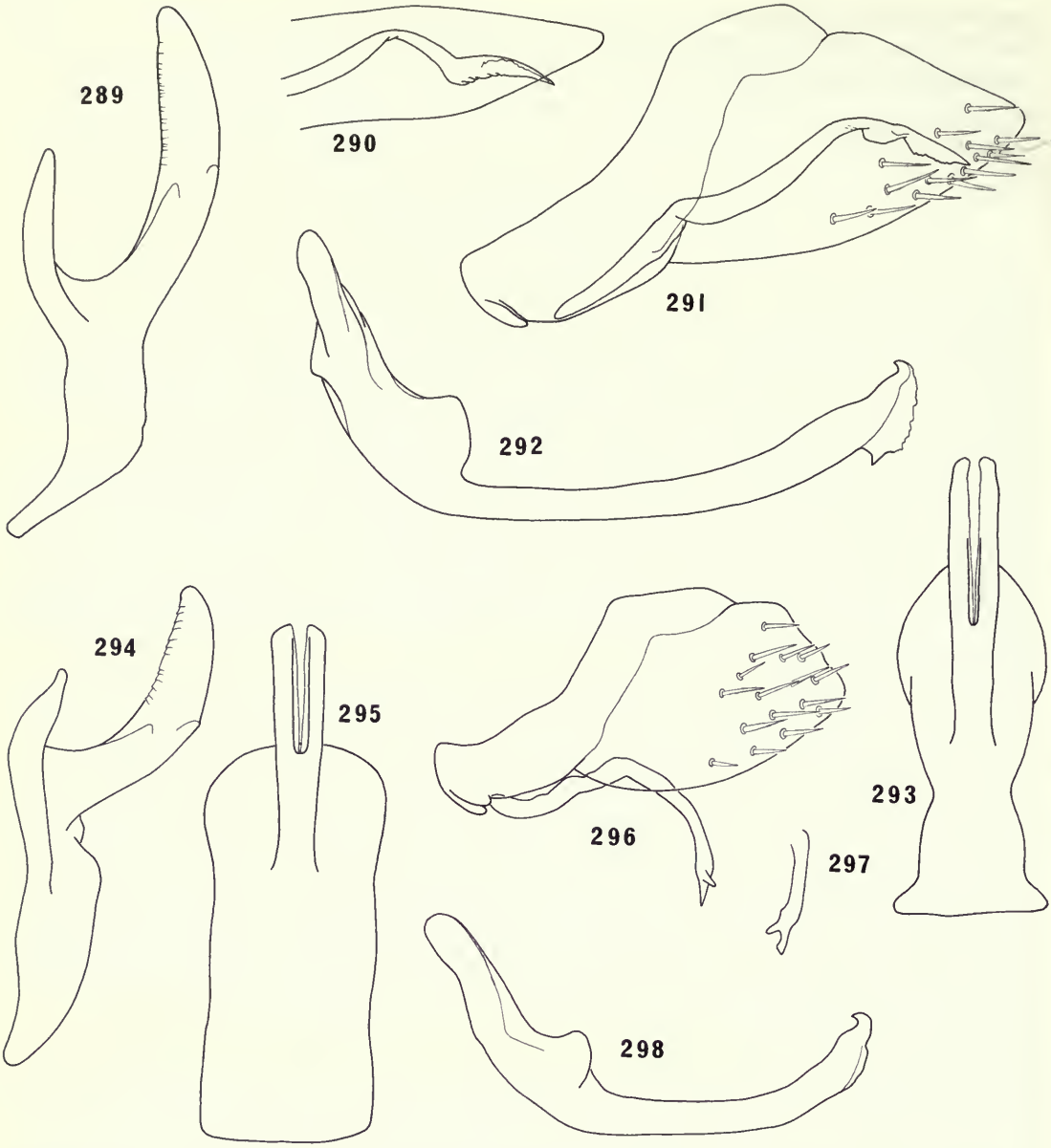
(Figs 294–298)

Length: ♂, 4·80 mm.

Forewings speckled with small dark brown spots.

Male genitalia. Pygophore processes slender, directed posteriorly and curving ventrally, apex slightly expanded and bifurcate, the two branches short and sclerotised. Styles with apical process slender, elongate, of uniform width throughout length, curving dorsally towards apex, terminating in a short acute dorsally hooked apex, ventral margin acutely ridged subapically. Aedeagus simple, its base strongly expanded ventrally; shaft directed dorsally; gonopore extending to approximately midlength of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. The orientation of the pygophore processes suggests that the single known specimen of this species may be abnormal in this respect and that the processes are usually directed more



Figs 289–298 289–293, *Batracomorphus pictus* (holotype). (289) aedeagus; (290) left pygophore lobe and process, ventral view; (291) pygophore; (292) style; (293) aedeagus. 294–298, *B. theseus*. (294, 295) aedeagus; (296) pygophore; (297) left pygophore process, posterior view; (298) style. (For further explanation see 'Techniques and methods'.)

posteriorly with only the apical portion turned ventrally. The present species is similar to *cheesmanae* from New Guinea and New Britain but differs in the shape of the apex of the pygophore process. (See additional remarks under *pictus*.)

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mountains, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

Batracomorphus cheesmanae sp. n.

(Figs 299–305)

Length: ♂, 4·00–5·20 mm (mean 4·60 mm).

Pronotum, scutellum and forewings speckled with variably sized dark brown spots.

Male genitalia. Pygophore processes slender, directed posteriorly, turned ventrally or posteromedially near midlength, apex turned dorsally, ventral margin acutely ridged and serrate subapically. Styles with apical process slender, elongate, of approximately uniform width throughout length, curving dorsally towards apex, terminating in a short acute dorsally hooked apex, ventral margin sometimes acutely ridged subapically. Aedeagus simple, its base strongly expanded ventrally; shaft directed dorsally; gonopore extending to just basad of midlength of shaft; anterior incision approximately equal in length to gonopore.

REMARKS. This species, known from Waigeu, the western and eastern ends of New Guinea and from New Britain, varies in the shape of the apex of the pygophore processes, the style and in overall body size. Specimens from the Cyclops Mountains and New Britain have the upturned apical portion of the pygophore processes relatively longer than in specimens from the Finisterre Mountains and Waigeu. The upturned apical portion of the style is also relatively longer in individuals from the Finisterre Mountains than elsewhere although intermediate forms are present in the Cyclops Mountains populations. As regards overall body size, short forms occur in Waigeu and in half of the Cyclops Mountains population although there is no detectable correlation with the shape of the genitalia. This species is similar to *theseus* in the shape of the aedeagus but differs in the shape of the pygophore processes. The pygophore processes resemble those in *cossus*, but the apical expansion is relatively smaller. The two species also differ in size, external markings and in the shape of the aedeagus. (See additional remarks under *pictus*.)

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Irian Jaya, Cyclops Mountains, Sabron, 610 m, vii.1936 (*L. E. Cheesman*) (BMNH).

Paratypes. **New Britain**: 1 ♂, 1 ♀ (BPBM). **New Guinea**: 7 ♂, Irian Jaya and Papua New Guinea (BMNH).

Batracomorphus cossus sp. n.

(Figs 306–310)

Length: ♂, 6·00 mm.

Male genitalia. Pygophore processes slender, directed dorsoposteriorly, apex turned mesally and strongly expanded into triangular lamellate plate, its posterior margin serrate. Styles with apical process slender, elongate, of approximately uniform width throughout length, turned dorsally towards apex, tapering to short acute dorsally hooked apex, ventral margin with prominent lamellate expansion subapically. Aedeagus simple, its base strongly expanded ventrally; shaft directed dorsally; gonopore extending to just basad of midlength of shaft; anterior incision extending more basad than gonopore.

REMARKS. This species is similar to *cheesmanae* from New Guinea and New Britain but is larger, lacks the dark brown spots on the pronotum, scutellum and forewings, and has a relatively larger expansion at the apex of the pygophore processes. They also differ in the shape of the aedeagus and the expansion at the apex of the style. (See additional remarks under *pictus*.)

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Aiyura, 27.ix.1957 (*J. Smart*) (BMNH).

Batracomorphus elegans (Evans)

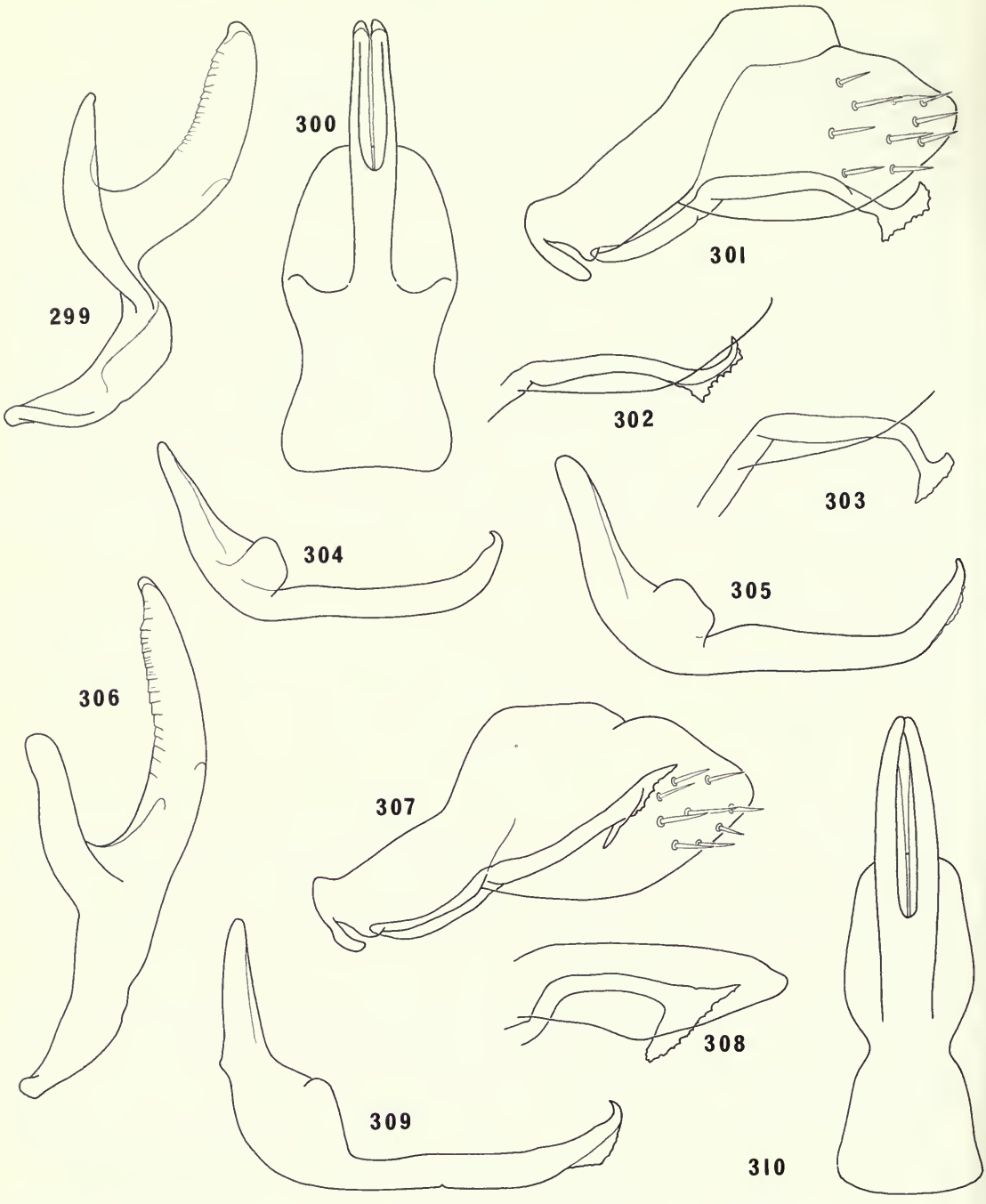
(Figs 311–313)

Eurinoscopus elegans Evans, 1935: 76. Holotype ♂, TASMANIA (AM) [examined].

Length: ♂, 5·5 mm.

Anterior area of face reddish brown; pronotum with three longitudinal reddish bands on each side of midline; scutellum with basal angles reddish.

Male genitalia. Pygophore processes slender, directed posteriorly, lamellately expanded distally and



Figs 299–310 299–305, *Batracomorphus cheesmanae*. (299, 300) aedeagus; (301) pygophore (Cyclops Mts, New Guinea); (302) left pygophore process (New Britain); (303) same (Finisterre Mts, New Guinea); (304) style (Cyclops Mts); (305) same (Finisterre Mts). 306–310, *B. cossus*. (306) aedeagus; (307) pygophore; (308) left pygophore lobe and process, posteroventral view; (309) style; (310) aedeagus. (For further explanation see 'Techniques and methods'.)

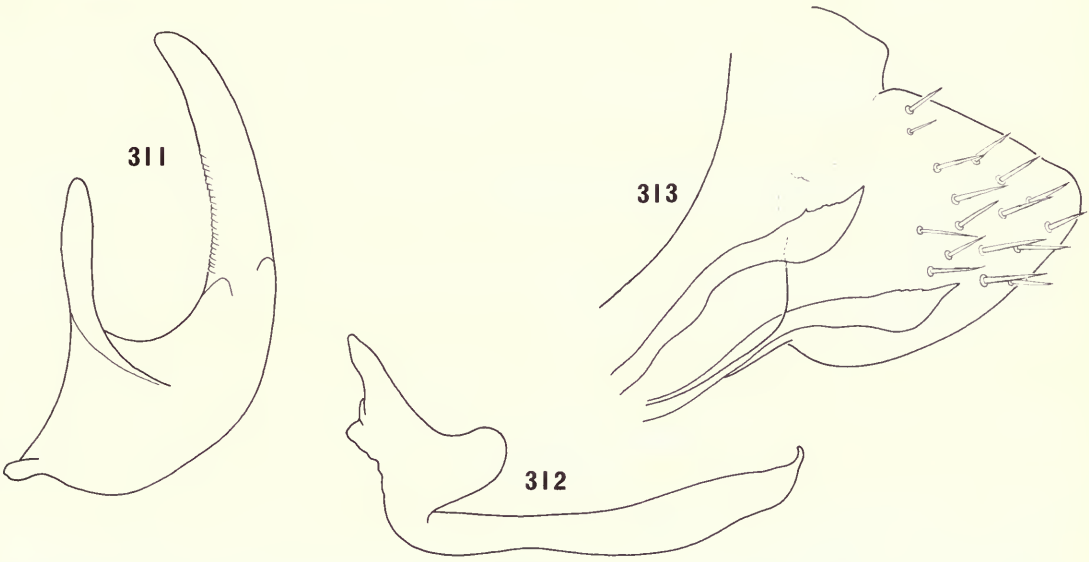
tapering abruptly to acute apex, dorsal margin of expansion mildly serrate. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, curving anterodorsally from midlength; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.

Remarks. The genitalia of the holotype are mounted on a slide and the pygophore processes consequently distorted. The orientation of these structures may therefore differ from the description given above. The species appears to be most closely related to *ganymede* from New Guinea but is slightly larger and with the pygophore processes more lineate and less claw-like apically. They also differ slightly in the shape of the aedeagus and style.

Distribution. Australia.

Material examined

Eurinoscopus elegans Evans, holotype ♂, **Australia**: Tasmania, Hobart (*Lea*) (AM).
Australia: 1 ♀, Tasmania (BMNH).



Figs 311–313 *Batracomorphus elegans* (holotype). 311, aedeagus; 312, style; 313, pygophore, left lateral view, slide preparation showing left and right processes. (For further explanation see 'Techniques and methods'.)

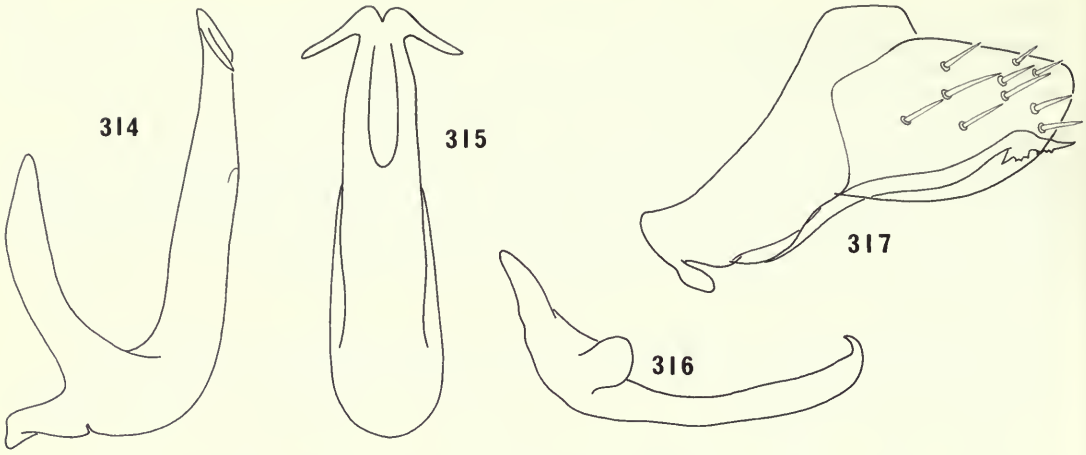
Batracomorphus rhesus sp. n.

(Figs 314–317)

Length: ♂, 4·16–4·40 mm (mean 4·28 mm).

Male genitalia. Pygophore processes slender, directed posteriorly at base, turned dorsoposteriorly near midlength, apical portion turned posteriorly with its ventral margin strongly dentate, apex acute and sometimes slightly upturned. Styles with apical process slender, elongate, of approximately uniform width throughout length, terminating in short acute dorsally hooked apex. Aedeagus with shaft directed dorsally, terminating in a pair of short, ventrally directed, diverging processes; gonopore extending approximately two-fifths length of shaft; anterior incision very short.

Remarks. This species differs from all others with normal subgenital plates in having apical processes on the aedeagus. The presence of such processes in other species is always accompanied by the absence of setae on either the dorsal or ventral margin of the subgenital plates. In general shape of the aedeagus and pygophore process, the present species most closely resembles *laodamia* from the Philippines and Borneo but differs, not only in having setae on the



Figs 314–317 *Batracomorphus rhesus*. 314, 315, aedeagus; 316, style; 317, pygophore. (For further explanation see 'Techniques and methods'.)

dorsolateral margin of the subgenital plates, but also in the shape of the pygophore processes and styles. It is known only from western Mindanao.

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Mindanao, Zamboanga del Norte Manucan, 25 km S, 500 m, 18.x.1959 (*L. W. Quate*) (BPBM, Type No. 12,541).

Paratype. **Philippines**: 1 ♂, Mindanao (BPBM).

Batracomorphus procne sp. n.

(Figs 318–327)

Length: ♂, 3·76–4·96 mm (mean 4·12 mm).

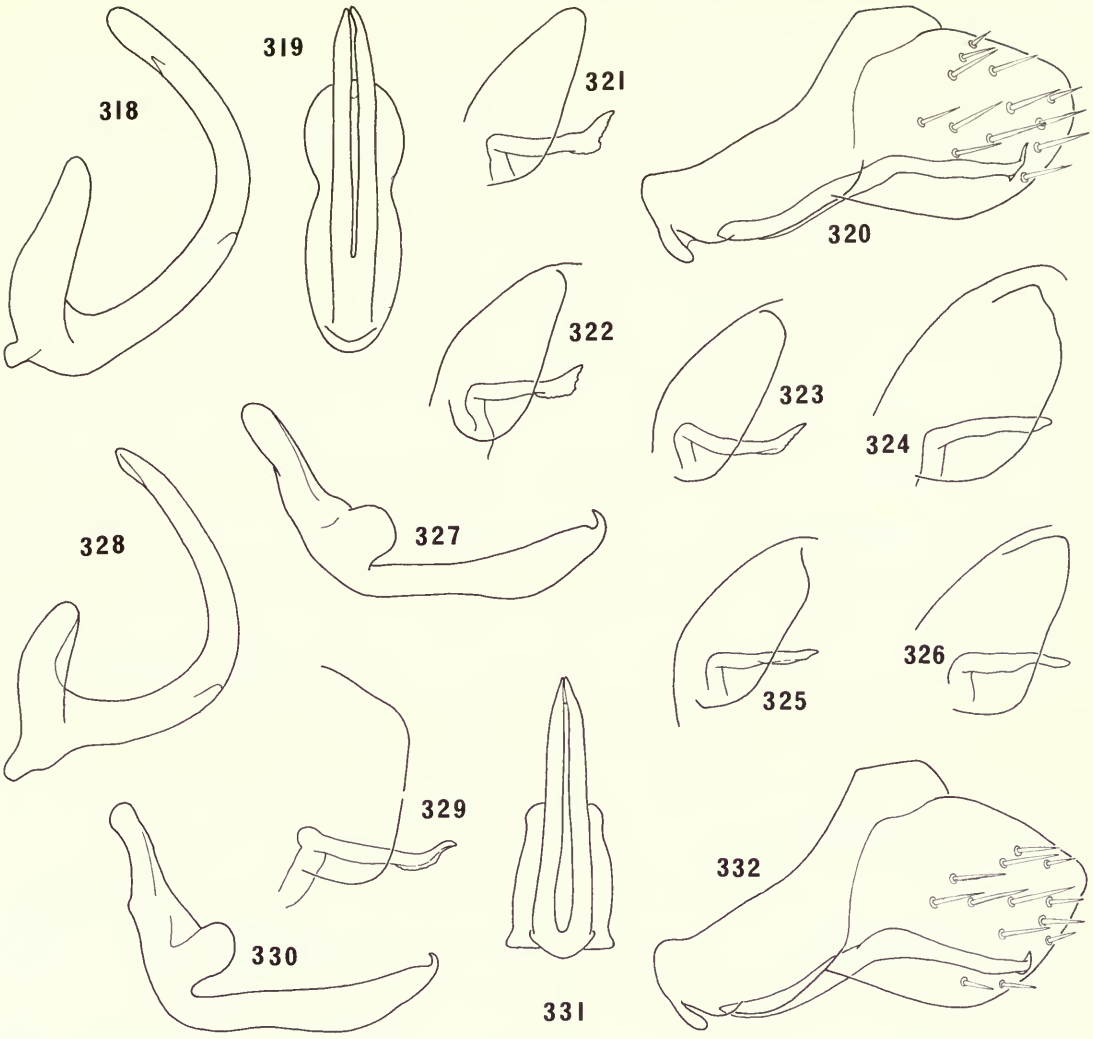
Male genitalia. Pygophore processes slender, directed posteriorly, apex acute, turned dorsomesally, a keel-like expansion subapically on ventral margin sometimes reduced or absent. Styles with apical process expanded over distal half, tapering to short acute dorsally directed apex. Aedeagus simple; shaft elongate, slender, directed dorsoposteriorly and curving anterodorsally; gonopore extending to just basad of midlength of shaft; anterior incision short.

REMARKS. The variation in the development of the apical expansion on the pygophore process often occurs within the same population as illustrated for the two specimens from Mindanao and the three specimens from Sabah. The present species is one of four closely related species (*procne, chlorophana, evander* and *silvanus*) characterised by the possession of an elongate and strongly recurved shaft to the aedeagus. It is most closely related to *chlorophana*, whose distribution is similar, but differs in the absence of a ventral extension at the base of the aedeagus and the normally larger expansion at the apex of the pygophore process. The reduced condition of the pygophore processes in the present species resembles the condition in *silvanus* from the Philippines and Borneo, but the latter species is distinguished by having a relatively shorter and less recurved shaft to the aedeagus and a subapical expansion on the ventral margin of the style.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, Tawau, Quoin Hill, Cocoa Research Station, 10.ix.1962 (*Y. Hirashima*) (BPBM, Type No. 12,542).

Paratypes. **Borneo**: 30 ♂, Sabah and Sarawak (BPBM). **Java**: 2 ♂, (BMNH, ITZ). **Philippines**: 20 ♂, 5 ♀, Leyte, Luzon, Mindanao, Palawan and Tawi Tawi (AMNH, BPBM, FMNH, USNM). **Sumatra**: 7 ♂, 1 ♀ (ITZ, USNM). **West Malaysia**: 3 ♂ (BMNH).



Figs 318–332 318–327, *Batracomorphus procne*. (318, 319) aedeagus; (320) pygophore (Tawau, Sabah); (321) left pygophore lobe and process (Mindanao), posterolateral view; (322) same (Tawau, Sabah); (323) same (Tawau, Sabah); (324) same (Java); (325) same (Tawau, Sabah); (326) same (Mindanao); (327) style. 328–332, *B. chlorophana*. (328) aedeagus; (329) left pygophore lobe and process, posterolateral view; (330) style; (331) aedeagus; (332) pygophore. (For further explanation see 'Techniques and methods'.)

Batracomorphus chlorophana (Melichar) sp. rev., comb. n.

(Figs 328–332)

Pachyopsis chlorophana Melichar, 1903: 153. Lectotype ♂, Sri Lanka (MM) [examined], here designated.

[*Iassus indicus* (Lethierry) sensu Metcalf, 1966: 53. Misidentification.]

[*Batracomorphus indicus* (Lethierry) sensu Linnavuori & Quartau, 1975: 144. Misidentification.]

Length: ♂, 4·08–4·56 mm (mean 4·32 mm).

Male genitalia. Pygophore processes slender, directed posteriorly or ventroposteriorly with apex acute and turned mesally or dorsomesally, a shallow keel-like expansion subapically on ventral margin. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus

simple; shaft elongate, slender, directed posteriorly and curving anterodorsally; gonopore extending approximately two-thirds length of shaft; anterior incision very short.

Remarks. The present species is mostly closely related to *procne* in having a subapical marginal expansion on the pygophore process but differs in that the expansion is smaller than in *procne* and the base of the aedeagus has a pronounced ventral extension and the shaft is directed more posteriorly at its base. The geographical distribution of these two species is very similar. (See additional remarks under *procne*.)

The type-series of *chlorophana*, deposited in MM, comprises two males and two females from Peradeniya, Sri Lanka. One of the males is parasitized and the other bears a lectotype label. In the absence of a previously published designation the latter specimen is here designated as lectotype. This species was considered by Metcalf (1966) and Linnavuori & Quartau (1975) as a synonym of *indicus* (Lethierry). The type-specimens of each species, however, are quite distinct and *chlorophana* is here recalled from synonymy. The previously recorded distribution of this species extends from Africa to Samoa and the Marquesas Islands. Linnavuori & Quartau (1975) consider the record for Africa to be incorrect and the present study was unable to confirm its presence in either Samoa or the Marquesas Islands. It is likely that the records for these three localities are based on misidentifications.

Distribution. Africa, Borneo*, Burma, Taiwan, India, Java, Marquesas Islands, Philippines, Samoa, Sri Lanka, West Malaysia* (* new records).

Material examined

Pachyopsis chlorophana Melichar, lectotype ♂, **Sri Lanka**: Peradeniya, 30.xii.1901 (*H. Uzel*) (MM).

Borneo: 83 ♂, 3 ♀, Sabah and Sarawak (BMNH, BPBM). **Java**: 1 ♂, 1 ♀ (BMNH). **Philippines**: 11 ♂, Balabac, Palawan and Tawi Tawi (ZM). **Sri Lanka**: 1 ♂, 2 ♀ (MM). **West Malaysia**: 1 ♂ (BMNH).

Batracomorphus evander sp. n.

(Figs 333–337)

[*Bythoscopus viridoflavidus* Metcalf, 1946: 136 (partim). Misidentification.]

Length: ♂, 3·44 mm.

Male genitalia. Pygophore processes slender, directed posteriorly, apex acute and turned dorsomesally. Styles with apical process only slightly expanded over distal half, tapering to short acute dorsally hooked apex, a small subapical tooth on ventral margin. Aedeagus simple; shaft elongate, slender, directed dorsally and curving anterodorsally; gonopore extending to near midlength of shaft; anterior incision very short.

Remarks. The present species is most closely related to *silvanus* from the Philippines and Borneo but is much smaller, has a relatively shorter and more posteriorly directed pygophore process and a more elongate and recurved shaft to the aedeagus. (See additional remarks under *procne*.) The holotype of this species was incorrectly identified by Metcalf as *viridoflavidus* and designated as a paratype of that species. It differs from that species, however, in length and in the shape of the pygophore processes, style and aedeagus.

Material examined

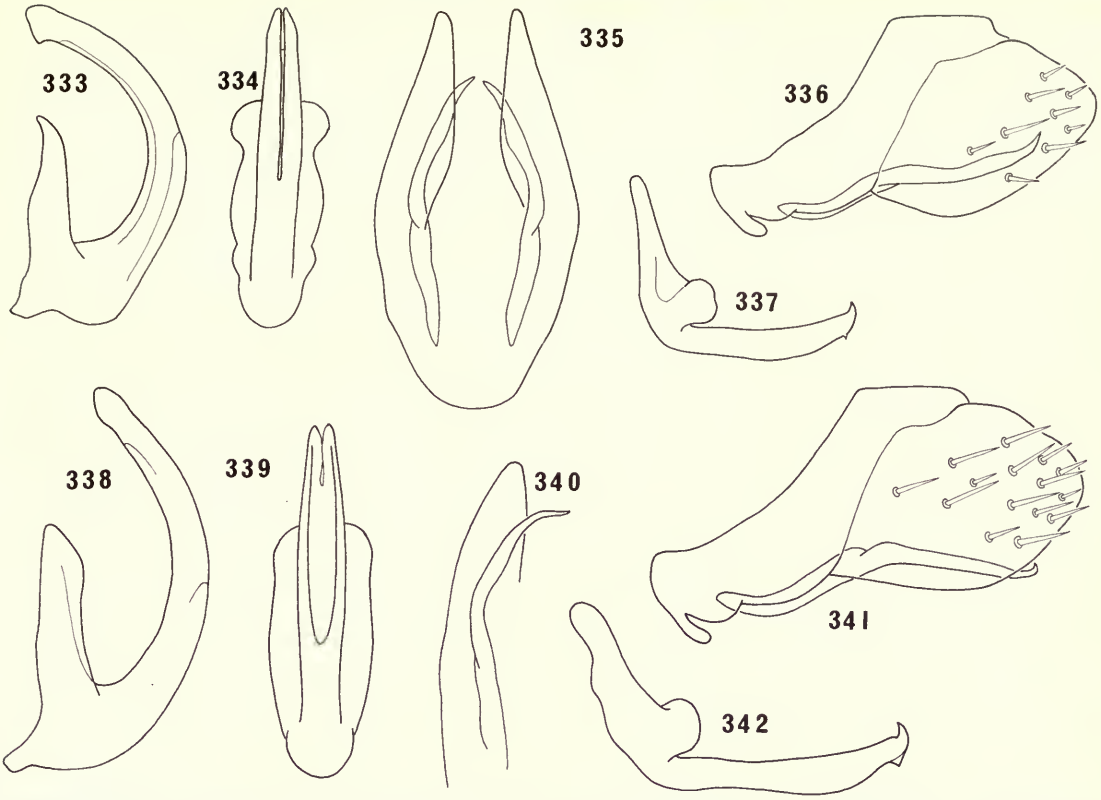
Holotype ♂, **Guam**: Mt Alifan, 20.iv.1936 (*E. H. Bryan*) (NCSU) (paratype of *Bythoscopus viridoflavidus* Metcalf).

Batracomorphus silvanus sp. n.

(Figs 338–342)

Length: ♂, 4·24–4·80 mm (mean 4·54 mm).

Male genitalia. Pygophore processes slender, elongate, directed posteriorly or ventroposteriorly, apex acute and turned medially. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex, a small triangular lamellate expansion subapically on ventral margin. Aedeagus simple; shaft slender, elongate, directed dorsally and curving anterodorsally; gonopore extending to just basad of midlength of shaft; anterior incision short.



Figs 333–342 333–337, *Batracomorphus evander*. (333, 334) aedeagus; (335) pygophore, ventral view; (336) pygophore; (337) style. 338–342, *B. silvanus* (Philippine specimen). (338, 339) aedeagus; (340) left pygophore lobe and process, ventral view; (341) pygophore; (342) style. (For further explanation see 'Techniques and methods'.)

Remarks. The present species is most closely related to *evander* from Guam but is larger, with the pygophore processes relatively longer and turned medially and the shaft of the aedeagus less recurved. (See additional remarks under *procne*.) This species appears to be the one erroneously described by Linnavuori (1960*a*) as *viridoflavidus* and recorded from the S. Mariana Islands and Caroline Islands.

Material examined

Holotype ♂, **Philippines**: Luzon, Camarines Sur, Mt Isarog, Pili, 800–1000 m, 3.v.1965 (*H. M. Torrevillas*) (BPBM, Type No. 12,543).

Paratypes. **Ambon Island**: 1 ♂, 3 ♀ (USNM). **Borneo**: 2 ♂, Sabah (BPBM). **Philippines**: 13 ♂, Luzon, Mindanao, Palawan and Tawi Tawi (BPBM, USNM, ZM).

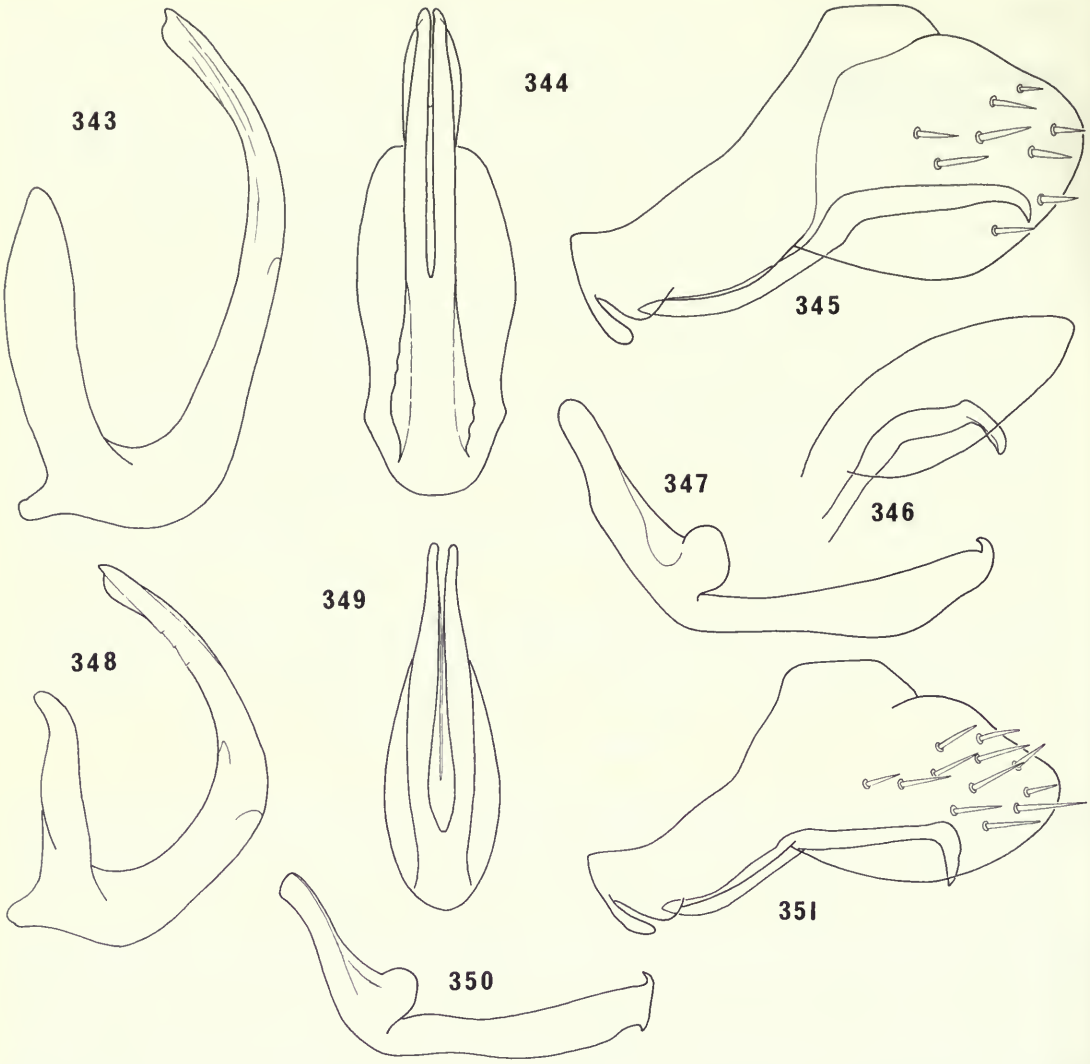
Batracomorphus romulus sp. n.

(Figs 343–347)

Length: ♂, 4·32 mm.

Male genitalia. Pygophore processes elongate, directed posteriorly, apex acute and turned ventromesally, ventral margin acuminate and slightly keeled subapically. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus with shaft slender, elongate, directed dorsally, apical third recurved anterodorsally, posterolateral margins expanded keel-like at base; gonopore extending to near midlength of shaft; anterior incision approximately one-fourth length of gonopore.

Remarks. This species is closely related to *pandarus* from Borneo but differs in having the shaft of the aedeagus more slender, curved more anteriorly and with basal expansions.



Figs 343–351 343–347, *Batracomorphus romulus*. (343, 344) aedeagus; (345) pygophore; (346) left pygophore lobe and process, posterior view; (347) style. 348–351, *B. pelops*. (348, 349) aedeagus; (350) style; (351) pygophore. (For further explanation see 'Techniques and methods'.)

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, Tawau, Quoin Hill, 3–7.vii.1962 (*H. Holtmann*) (BPBM, Type No. 12,544).

Batracomorphus pelops sp. n.

(Figs 348–351)

Length: ♂, 4·56 mm.

Forewings speckled with very small dark brown spots.

Male genitalia. Pygophore processes elongate, directed posteriorly, apical one-fourth turned abruptly ventrally and slightly expanded, apex acute. Styles with apical process slightly expanded over distal half, tapering to short acute dorsally hooked apex, a triangular lamellate expansion subapically on ventral margin. Aedeagus with shaft slender, elongate, directed dorsoposteriorly and curving anterodorsally at midlength; a pair of small triangular expansions subapically on anterior margin; gonopore extending approximately two-thirds length of shaft; anterior incision extending to midlength of shaft.

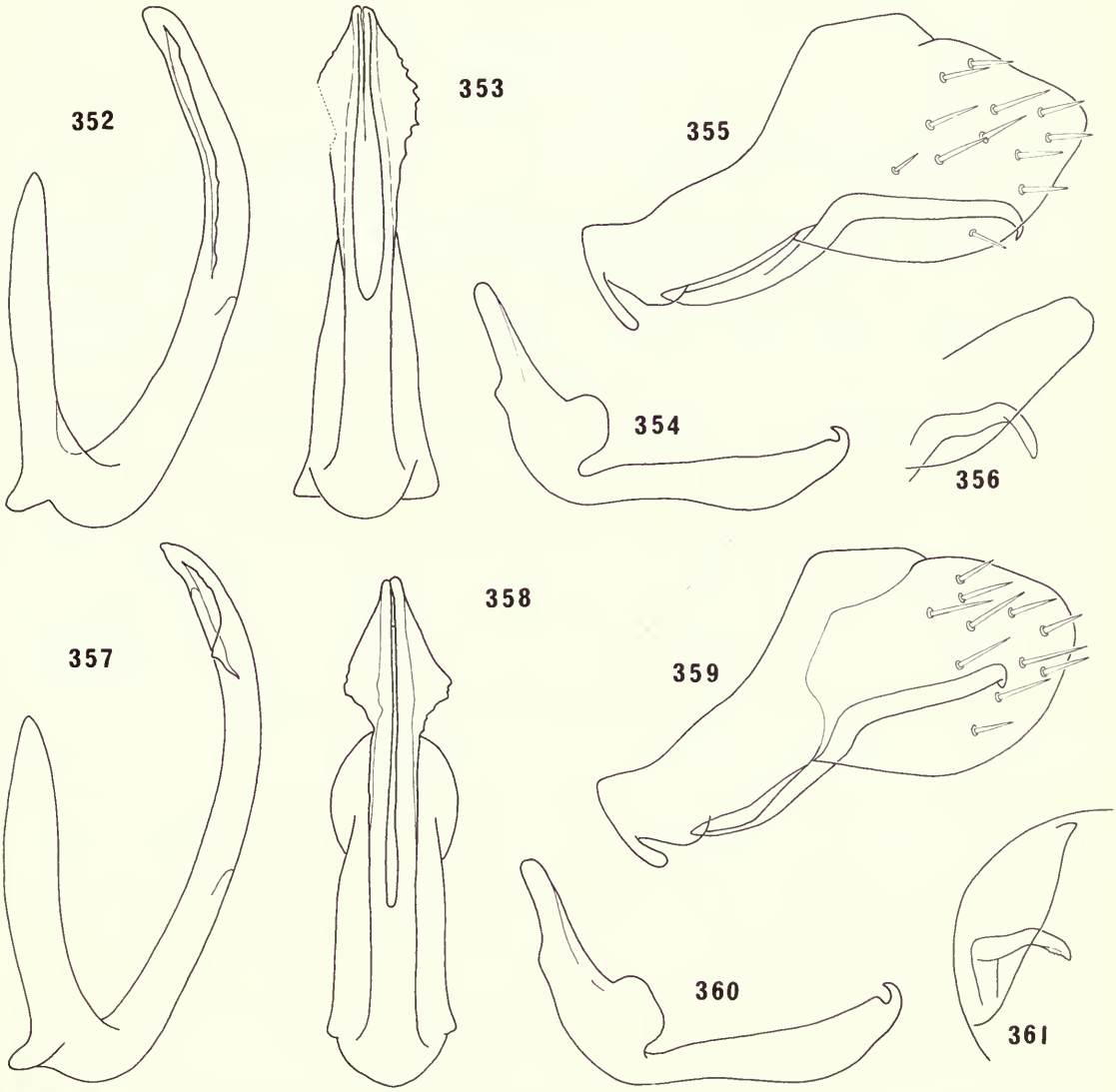
REMARKS. This species resembles *procne, chlorophana, evander* and *silvanus* in the general shape of the aedeagus but differs from all four in having a long rather than short anterior incision. It differs from them also in the shape of the pygophore processes and in having dark brown spots on the forewings. It is most closely related to *romulus* from Borneo but differs in having the shaft of the aedeagus more strongly recurved and the anterior incision relatively longer, the pygophore processes turned more abruptly ventrally, the style with a subapical expansion on the ventral margin and the forewings speckled with small dark brown spots.

MATERIAL EXAMINED

Holotype ♂, **Sulawesi**: Minahassa, Tomohon, 30.vii.1954 (*A. H. G. Alston*) (BMNH).

***Batracomorphus peteos* sp. n.**

(Figs 352–361)



Figs 352–361 *Batracomorphus peteos*. 352–356, Sarawak specimen; 357–361, Sabah specimen. (352, 353) aedeagus; (354) style; (355) pygophore; (356) left pygophore lobe and process, posterior view; (357, 358) aedeagus; (359) pygophore; (360) style; (361) left pygophore lobe and process, posterior view. (For further explanation see 'Techniques and methods'.)

Length: ♂, 4·40–4·88 mm (mean 4·64 mm).

Male genitalia. Pygophore processes slender, elongate, directed posteriorly or dorsoposteriorly, apex acute, turned mesally, ventral margin sometimes acuminate subapically. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus with shaft slender, elongate, directed dorsally with apical third curving anterodorsally; lateral margin over distal one-fourth to one-half expanded as lamellate triangular flange; gonopore extending to just basad of midlength of shaft; anterior incision short.

Remarks. This species is closely related to *romulus* from Borneo but has apical rather than basal expansions on the shaft of the aedeagus.

Material examined

Holotype ♂, **Borneo**: Sarawak, Mt Dulit, 1220 m, moss forest, 17.x.1932 (*B. M. Hobby & A. W. Moore*) (BMNH).

Paratypes. **Borneo**: 1 ♂, 1 ♀, Sabah and Sarawak (BMNH, BPBM).

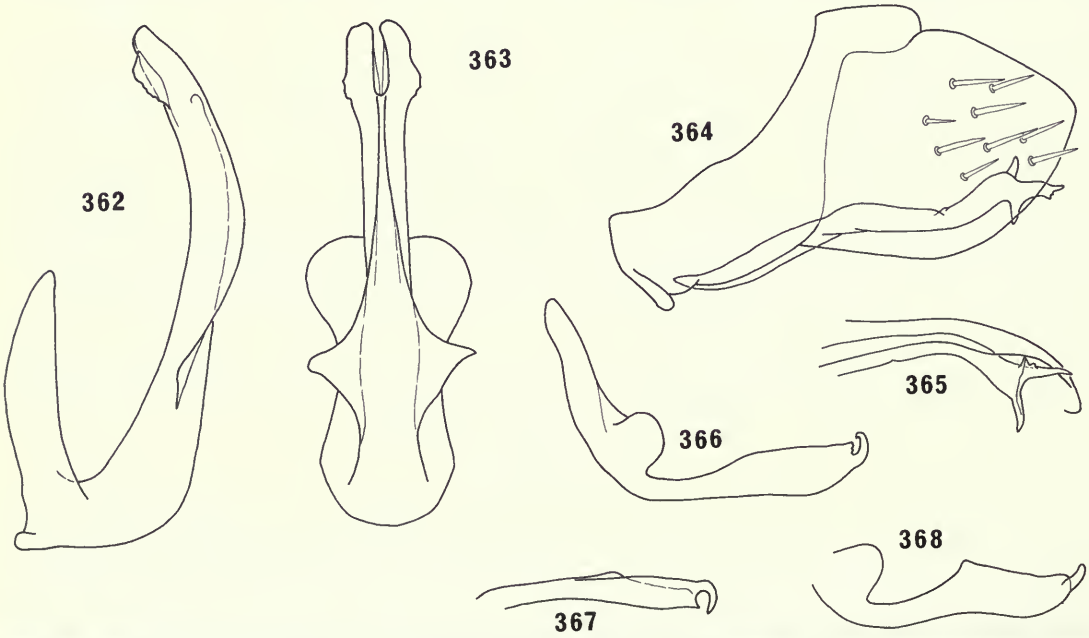
Batracomorphus itys sp. n.

(Figs 362–368)

Length: ♂, 4·40–4·64 mm (mean 4·49 mm).

Male genitalia. Pygophore processes directed posteriorly, turned dorsoposteriorly distally, terminating in three short acute branches, one directed posteriorly, another ventrally and the third mesally, the ventral margin between ventral and posterior branch and between ventral and mesal branch acutely ridged. Styles with apical process strongly expanded over distal half with pronounced lateral prominence at midlength; abruptly narrowed subapically to short finger-like dorsally hooked apex. Aedeagus with shaft slender, directed dorsally, recurved anterodorsally over apical half; a pair of lateral triangular, lamellate expansions immediately basad of midlength, continuing apically as a pair of narrow keel-like expansions on posterior margin to gonopore; apex with a pair of small lamellate expansions laterally; gonopore and anterior incision short, of approximately equal length.

Remarks. The specimens from Palawan and West Malaysia lack the lateral triangular expansions at the midlength of the aedeagus but are otherwise identical to the holotype. The species



Figs 362–368 *Batracomorphus itys* (Sumatra specimen). 362, 363, aedeagus; 364, pygophore; 365, left pygophore lobe and process, ventral view; 366, style; 367, same, mesoventral view; 368, same, ventral view. (For further explanation see 'Techniques and methods'.)

appears to be most closely related to *peteos* from Borneo but differs in the size and shape of the expansions on the aedeagus, the relative length of the gonopore, and in the shape of the pygophore processes. The pygophore processes in the present species are superficially similar to those of *dido* from the Philippines but the two differ markedly in the shape of both the aedeagus and style.

MATERIAL EXAMINED

Holotype ♂, **Sumatra**: west (USNM).

Paratypes. **Philippines**: 1 ♂, Palawan (ZM). **Sumatra**: 2 ♂ (USNM). **West Malaysia**: 1 ♂ (BMNH).

Batracomorphus pandarus sp. n.

(Figs 369–373)

Length: ♂, 4·40–5·20 mm (mean 4·76 mm).

Male genitalia. Pygophore processes slender, directed posteriorly, apex turned medially, acutely rounded or obliquely truncate. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus with shaft slender, directed dorsally with apical one-fourth curving anterodorsally, tapering to apex in both lateral and posterior aspect, anterolateral margins produced flange-like apically and turned anteriorly; gonopore extending approximately two-fifths length of shaft, sometimes bordered over its distal half with a few minute tubercles; anterior incision extending approximately half length of gonopore.

REMARKS. This species resembles *romulus* from Borneo but has a more robust aedeagus and lacks the lateral flange-like expansions at the base of the shaft.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, Tenompok, 1460 m, Jesselton, 48 km E., 17–21.x.1958 (*T. C. Maa*) (BPBM, Type No. 12,545).

Paratypes. **Borneo**: 2 ♂, Sabah and Sarawak (BPBM).

Batracomorphus protesilaus sp. n.

(Figs 374–379)

Length: ♂, 4·64 mm.

Male genitalia. Pygophore processes slender, directed posteriorly, apex spatulate, obliquely truncate, turned mesally. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus with shaft directed dorsally, compressed anteroposteriorly with lateral margins acuminate, tapering to apex in lateral aspect, apex broadly rounded in posterior aspect, posterior surface with small tubercles distally along apical half of gonopore; gonopore extending to midlength of shaft; anterior incision slightly less than half length of gonopore.

REMARKS. This species is closely related to *ilioneus* from the Philippines, Borneo and West Malaysia but has the apical process of the style less robust, the shaft of the aedeagus tapering to the apex in lateral aspect and the posterior tubercles fewer in number and more scattered.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, Tawau, Quoin Hill, Cocoa Research Station, 20.viii.1962 (*Y. Hirashima*) (BPBM, Type No. 12,546).

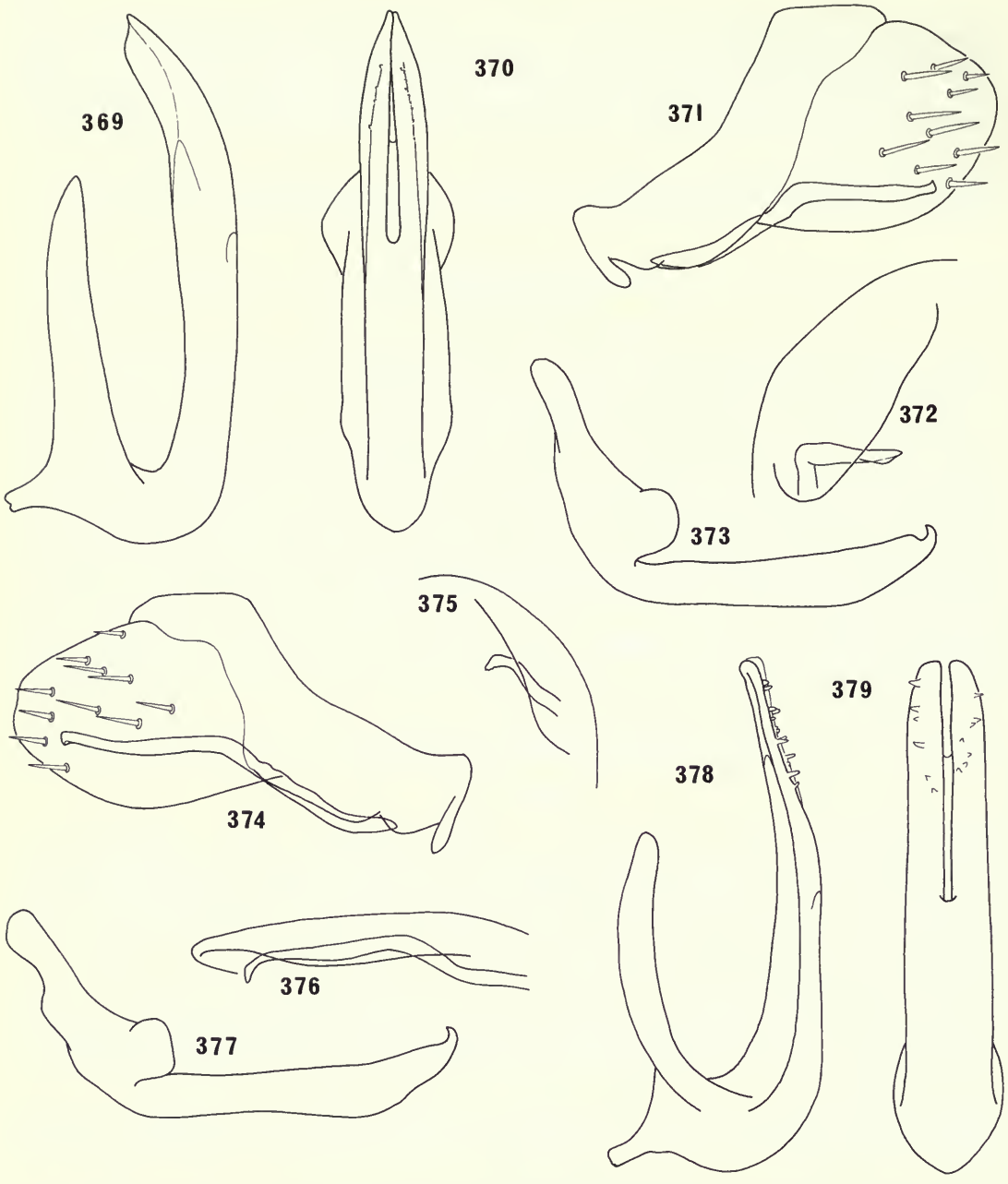
Batracomorphus serranus sp. n.

(Figs 380–384)

Length: ♂, 4·72–5·12 mm (mean 4·83 mm).

Colour brown, forewings stramineous.

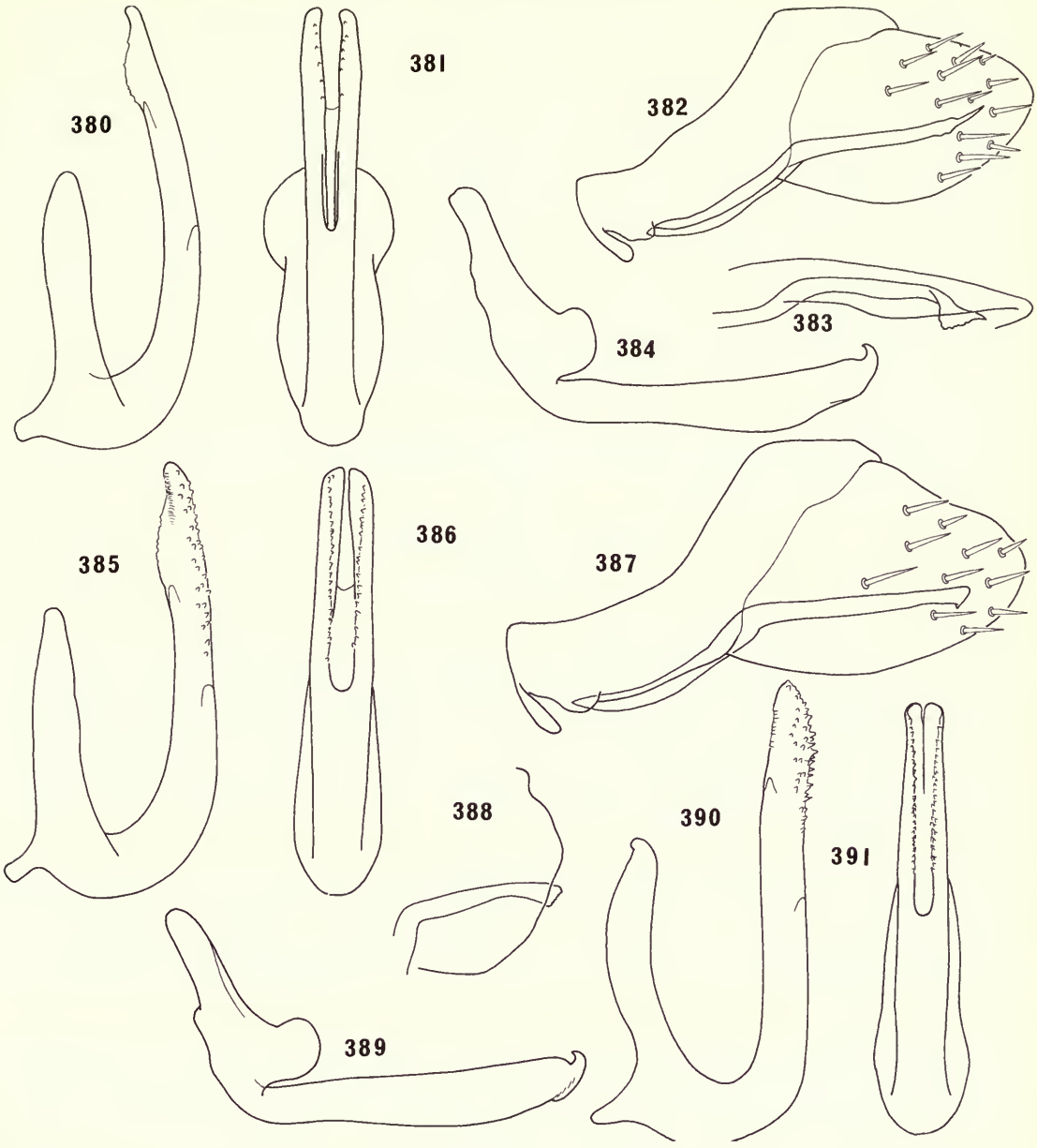
Male genitalia. Pygophore processes slender, straight, directed posteriorly or dorsoposteriorly, apex turned medially and lamellately expanded with its medial edge sometimes variously incised and rarely bifurcate. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus with shaft slender, elongate, directed dorsally; gonopore extending to midlength of shaft; anterior incision approximately one-third to one-half length of gonopore, its lateral margins sometimes



Figs 369–379 369–373, *Batracomorphus pandarus*. (369, 370) aedeagus; (371) pygophore; (372) left pygophore lobe and process, posterior view; (373) style. 374–379, *B. protesilaus*. (374) pygophore, right lateral view; (375) right pygophore lobe and process, posterior view; (376) same, ventral view; (377) style; (378, 379) aedeagus. (For further explanation see 'Techniques and methods'.)

turned anteriorly and protruding from shaft in lateral aspect; a few small tubercles along margins of gonopore over its distal half.

Remarks. This species is closely related to *ilioneus* from the Philippines, Borneo and West Malaysia but differs in the shape of the pygophore processes, a much smaller number of



Figs 380–391 380–384, *Batracomorphus serranus*. (380, 381) aedeagus; (382) pygophore; (383) left pygophore lobe and process, ventral view; (384) style. 385–391, *B. ilioneus*. (385, 386) aedeagus, usual shape (Borneo); (387) pygophore; (388) left pygophore lobe and process, posterolateral view; (389) style; (390, 391) aedeagus (Philippines). (For further explanation see 'Techniques and methods'.)

tubercles bordering the gonopore, and the absence of dark brown spots on the pronotum and forewings. It is known only from north-western Malaya.

MATERIAL EXAMINED

Holotype ♂, **West Malaysia**: Perak, Larut Hills, 1128 m, 12.ii.1932 (*H. M. Pendlebury*) (BMNH). Paratypes. **West Malaysia**: 5 ♂, 1 ♀ (BMNH).

Batracomorphus ilioneus sp. n.

(Figs 385–391)

Length: ♂, 4·32–5·20 mm (mean 4·69 mm).

Pronotum sometimes speckled with small variably sized dark brown spots; forewings mottled with small variably sized dark brown spots, sometimes faintly so, and also sometimes speckled with minute dark brown dots.

Male genitalia. Pygophore processes slender, straight, directed posteriorly, apex turned medially, spatulate, truncate, sometimes obliquely truncate and rarely acute. Styles with apical process slightly expanded over distal half, tapering to short acute dorsally hooked apex, sometimes slightly expanded keel-like subapically on ventral margin. Aedeagus with shaft slender, elongate, directed dorsally; gonopore extending to approximately midlength of shaft; anterior incision extending approximately one-third to two-thirds length of gonopore, its lateral margins usually turned anteriorly and protruding from shaft in lateral aspect; numerous small tubercles along lateral margins of gonopore to near its base.

Remarks. A specimen from G. Kledang, Perak, West Malaysia, lacks tubercles alongside the gonopore. This species is closely related to *serranus* from West Malaysia but differs in the shape of the pygophore processes, the more numerous tubercles alongside the gonopore, and the presence of dark brown spots on the forewings and sometimes also on the pronotum.

Material examined

Holotype ♂, **Borneo**: Sarawak, Bau, Lake area, 30.viii.1958 (*T. C. Maa*) (BPBM, Type No. 12,547).

Paratypes. **Borneo**: 8 ♂, Sabah and Sarawak (BPBM). **Philippines**: 4 ♂, Balabac, Luzon and Palawan (FMNH, USNM, ZM). **West Malaysia**: 2 ♂ (BMNH).

Batracomorphus teucer sp. n.

(Figs 392–396)

Length: ♂, 4·24–4·80 mm (mean 4·47 mm).

Male genitalia. Pygophore processes slender, directed posteriorly to near midlength and then turned dorsoposteriorly, apex acute and turned ventrally, ventral margin denticulate subapically for approximately one-third length of process, the tooth at each end of series being considerably larger than others. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus with shaft slender, directed dorsoposteriorly at base and recurved anterodorsally near midlength, posterior margin expanded keel-like over distal half on each side of gonopore, lateral margins expanded keel-like over approximately distal one-fourth; gonopore extending to just before midlength of shaft; anterior incision extending approximately one-third length of shaft.

Remarks. The present species is one of three closely related species (*teucer, harpalyce* and *ascanius*) which are characterised by the shape of the pygophore processes. It is much smaller than *harpalyce* from Borneo and differs also in the shape of the aedeagus and in having a less robust pygophore process. It differs from *ascanius*, which occurs in both the Philippines and Borneo, in the shape of the aedeagus and the absence of an enlarged ventral tooth on the pygophore process.

Material examined

Holotype ♂, **Borneo**: Sarawak, foot of Mt Dulit, junction of rivers Tinjar and Lejok, 27.viii.1932 (*B. M. Hobby & A. W. Moore*) (BMNH).

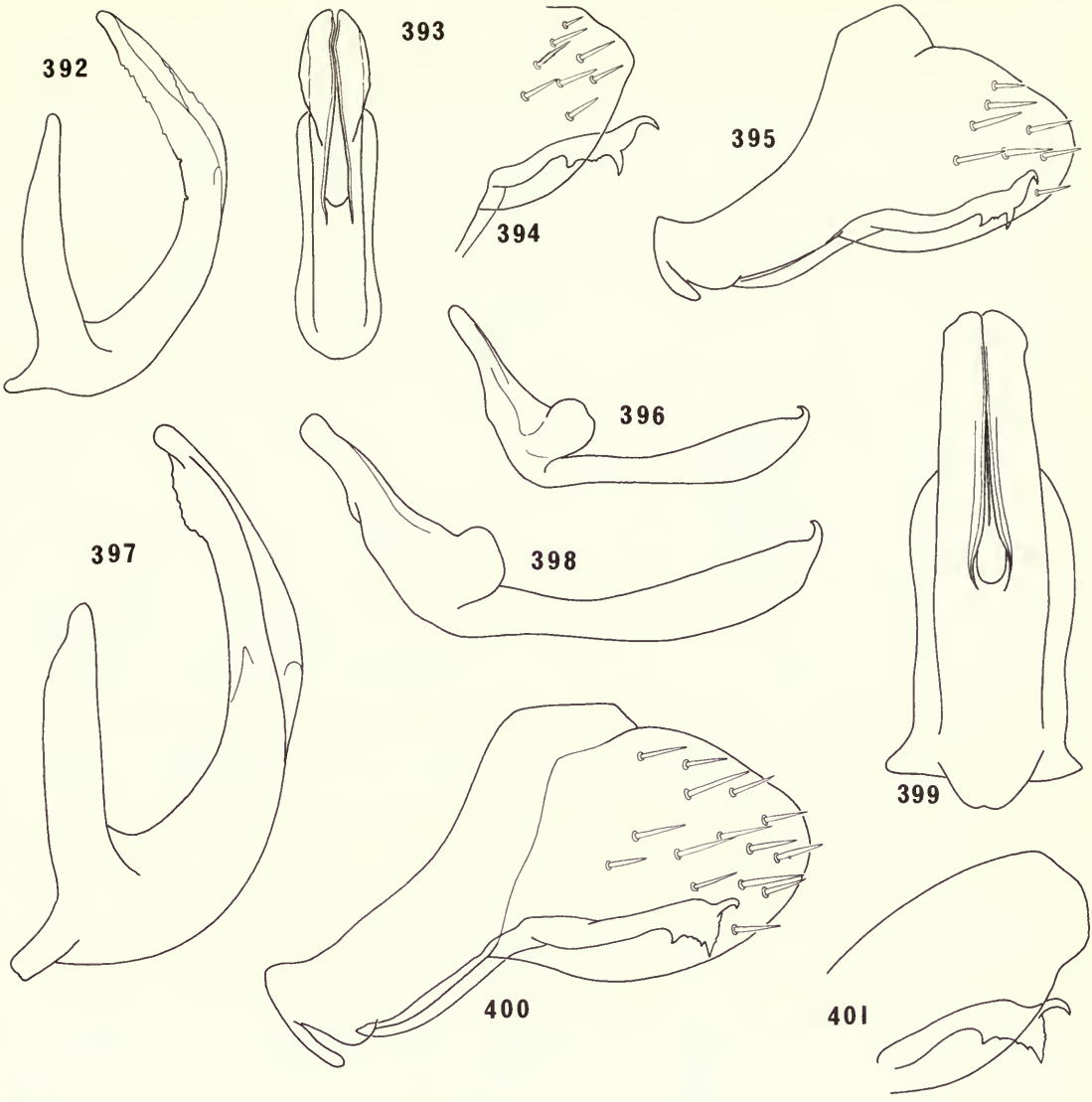
Paratypes. **Borneo**: 6 ♂, 3 ♀, Sabah and Sarawak (BMNH, BPBM). **Philippines**: 5 ♂, Luzon, Negros and Palawan (BPBM, ZM). **West Malaysia**: 3 ♂ (BMNH).

Batracomorphus harpalyce sp. n.

(Figs 397–401)

Length: ♂, 5·68–5·76 mm (mean 5·72 mm).

Male genitalia. Pygophore processes directed posteriorly to near midlength and then turned posteromesally, apex acute, finger-like, turned ventrally, ventral margin expanded plate-like over distal one-third with its ventral edge dentate, the tooth at each end of series being considerably larger than others. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus with shaft directed dorsally, recurved anterodorsally at midlength, tapering to apex in lateral aspect, broadly rounded apically in posterior aspect; gonopore extending to near midlength of shaft, spout-like with posterior margin projecting keel-like on each side to near apex; anterior incision



Figs 392–401 392–396, *Batracomorphus teucer*. (392, 393) aedeagus; (394) left pygophore lobe and process, posteroventral view; (395) pygophore; (396) style. 397–401, *B. harpalyce*. (397) aedeagus; (398) style; (399) aedeagus; (400) pygophore; (401) left pygophore lobe and process, posterolateral view. (For further explanation see 'Techniques and methods'.)

approximately same length as gonopore with anterior margin of shaft projecting keel-like on each side over its distal half.

Remarks. This species is most closely related to *teucer* from the Philippines, Borneo and West Malaysia but is much larger and differs also in the shape of the aedeagus and in having a more robust pygophore process. (See additional remarks under *teucer*.)

Material examined

Holotype ♂, **Borneo**: Sarawak, Nanga Pelagus near Kapit, 180–585 m, 7–14.viii.1958 (*T. C. Maa*) (BPBM, Type No. 12,548).

Paratype. **Borneo**: 1 ♂, Sabah (BPBM).

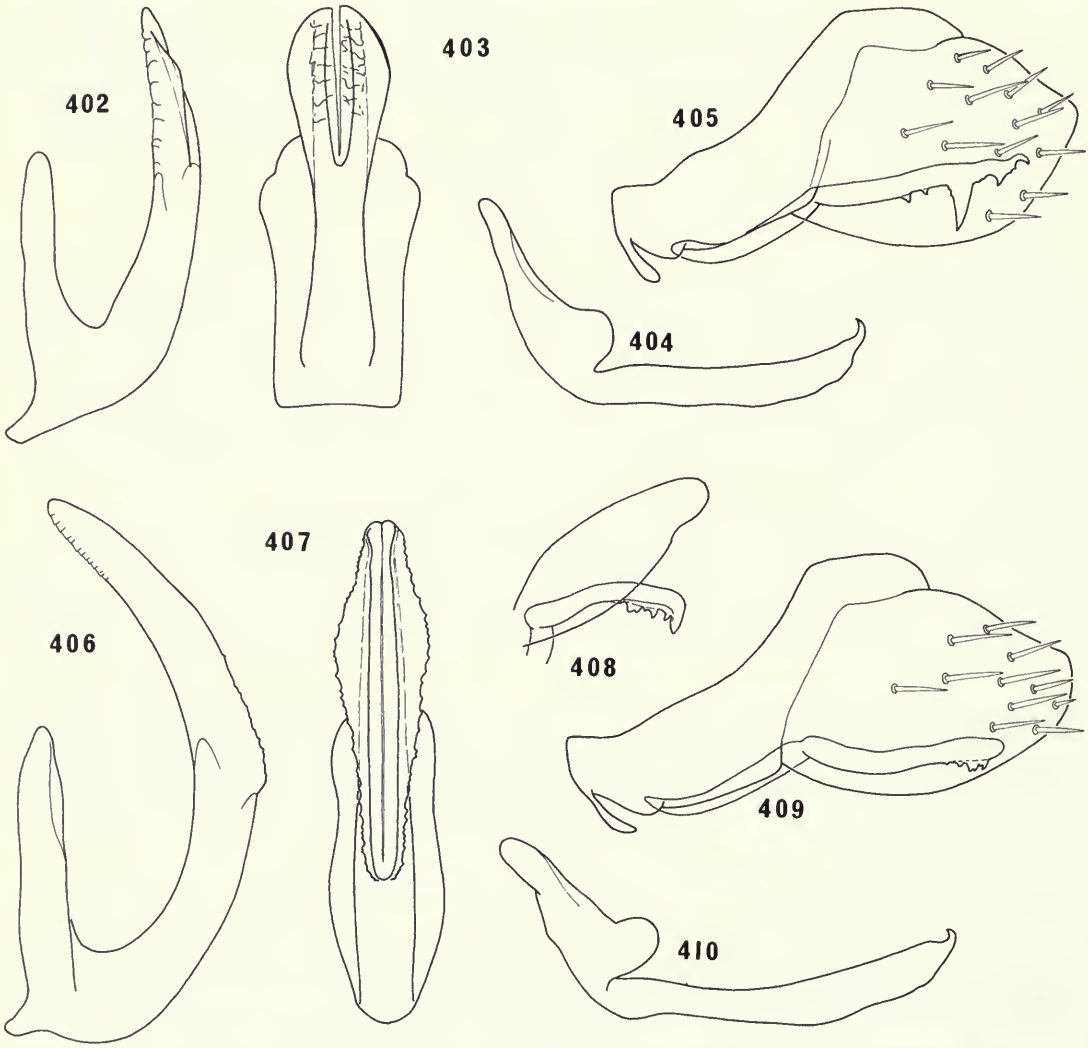
Batracomorphus ascanius sp. n.

(Figs 402–405)

Length: ♂, 4·16–4·64 mm (mean 4·36 mm).

Male genitalia. Pygophore processes directed posteriorly, apex acute, finger-like, turned ventrally, ventral margin with two dentate projections on distal half, the proximal one much larger than distal one, ventral margin sometimes with additional smaller dentition. Styles with apical process only slightly expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus with shaft directed dorsally, tapering to apex in lateral aspect, with lateral lamellate expansions over apical half; gonopore extending to near midlength of shaft; anterior incision approximately same length as gonopore.

Remarks. This species is most closely related to *teucer* from Borneo, the Philippines and West Malaysia but differs in having a straight rather than recurved shaft to the aedeagus and in lacking keel-like extensions on the posterior margin. The styles in the present species are also of more



Figs 402–410 402–405, *Batracomorphus ascanius* (Philippine specimen). (402, 403) aedeagus; (404) style; (405) pygophore. 406–410, *B. erato*. (406, 407) aedeagus; (408) left pygophore lobe and process, posterolateral view; (409) pygophore; (410) style. (For further explanation see 'Techniques and methods'.)

uniform width and the pygophore processes have the proximal tooth on the ventral margin much larger than the distal one. (See additional remarks under *teucer*.)

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Mindanao, Z. del Sur, 11 km NW. of Milbuk, 390 m, 5.viii.1958 (*H. E. Milliron*) (BPBM, Type No. 12,549).

Paratypes. **Borneo**: 53 ♂, Sabah (BPBM). **Philippines**: 4 ♂, 1 ♀, Mindanao and Palawan (BPBM, ZM).

Batracomorphus erato sp. n.

(Figs 406–410)

Length: ♂, 4·24–4·48 mm (mean 4·34 mm).

Male genitalia. Pygophore processes slender, directed posteriorly, turned posteromesally or posterodorsally distad of midlength, apex acute and turned ventrally, ventral margin with a row of small irregular teeth over distal third. Styles with apical process elongate, slightly expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft elongate, directed dorsally and recurved anteriorly over distal half; gonopore extending to just basad of midlength of shaft, its lateral margins expanded flange-like and divergent with edges serrate; anterior incision slightly shorter than gonopore.

REMARKS. This species is similar to *teucer* from Borneo, Philippines and West Malaysia but differs in having a more robust and less ornate pygophore process, a more elongate and less expanded style and in the shape of the aedeagus. It also resembles *peteos* from Borneo but has a more recurved aedeagus with a longer anterior incision, a more elongate and less expanded style, and the ventral margin of the pygophore processes dentate apically.

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Luzon, Zambales Province (*Baker*) (USNM).

Paratypes. **Philippines**: 2 ♂, Mindanao and Palawan (FMNH, ZM).

Batracomorphus dolon sp. n.

(Figs 411–416)

Length: ♂, 4·24–4·48 mm (mean 4·36 mm).

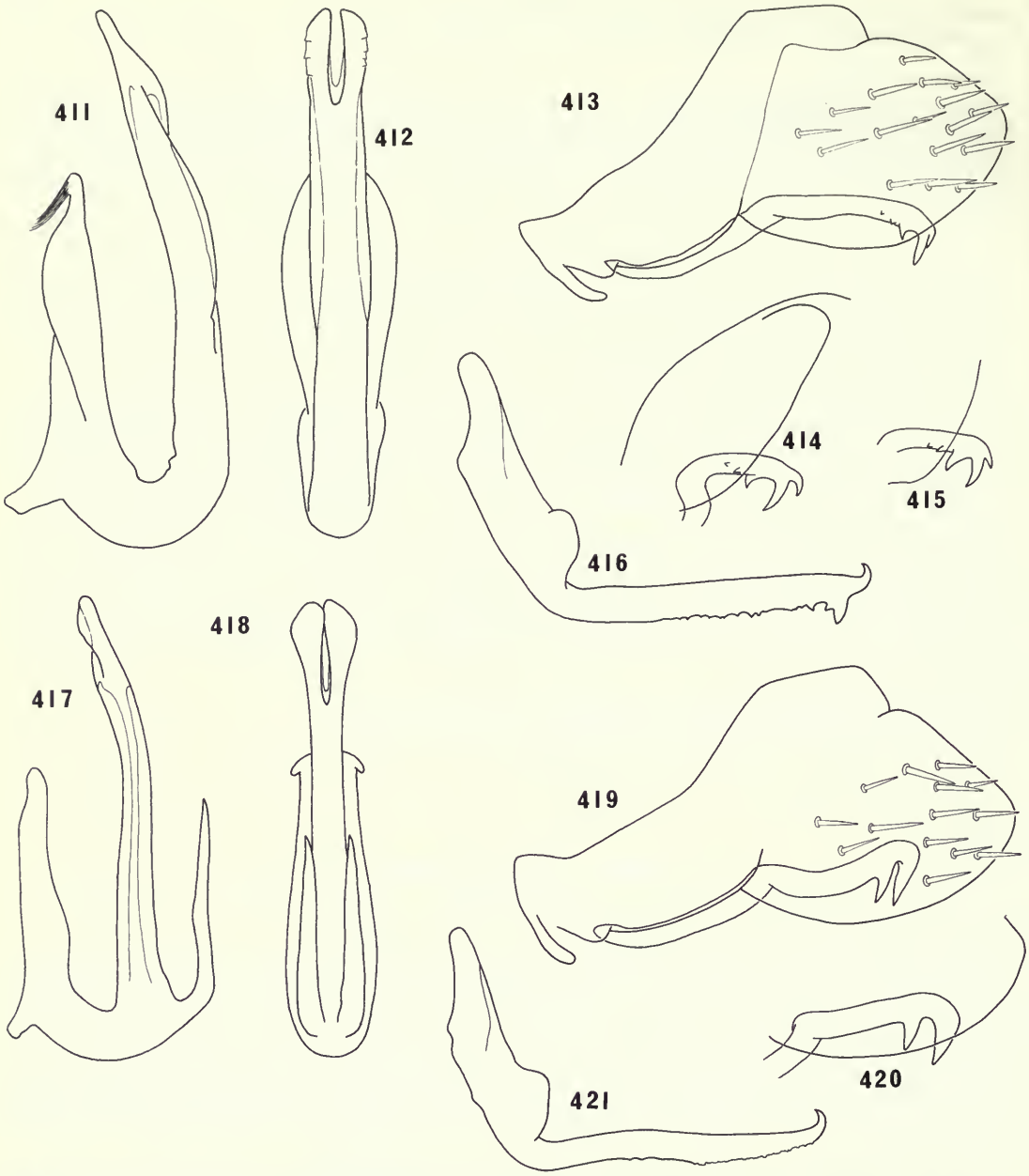
Male genitalia. Pygophore processes slender, directed posteriorly over basal half, then mesoposteriorly, apex acute, turned ventrally, a series of variably sized ventrally directed teeth along ventral edge of distal third. Styles with apical process elongate, slender, of uniform width, terminating in short acute dorsally hooked apex; ventral margin acuminate and serrate over distal half with a large ventrally directed tooth subapically. Aedeagus with shaft slender, directed dorsally and turned slightly anterodorsally at midlength, tapering to apex in lateral aspect; posterolateral margins expanded keel-like to near apex; posterior margin produced keel-like on each side of gonopore near apex; gonopore short; anterior incision slightly shorter than gonopore.

REMARKS. This species resembles *erato* from the Philippines in the general shape of the pygophore processes but differs in having the teeth relatively longer. It also differs in having the shaft of the aedeagus less curved, the gonopore and anterior incision much shorter, and the apical process of the style of uniform width and with the ventral margin serrate. It resembles *itys* from Sumatra, Philippines and West Malaysia in having only a short gonopore and anterior incision but differs in other aspects of the aedeagus as well as in the shape of the pygophore processes and styles.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, Tawau, Quoin Hill, Cocoa Research Station, 6.ix.1962 (*Y. Hirashima*) (BPBM, Type No. 12,550).

Paratype. **Borneo**: 1 ♂, same data as holotype.



Figs 411–421 411–416, *Batracomorphus dolon*. (411, 412) aedeagus; (413) pygophore; (414) left pygophore lobe and process, posterolateral view; (415) same, different specimen; (416) style. 417–421, *B. ammon*. (417, 418) aedeagus; (419) pygophore; (420) left pygophore lobe and process, posterolateral view; (421) style. (For further explanation see 'Techniques and methods'.)

Batracomorphus ammon sp. n.

(Figs 417–421)

Length: ♂, 3·92–4·40 mm (mean 4·14 mm).

Male genitalia. Pygophore processes robust, directed dorsoposteriorly and curving medially, apex acute, turned ventrally, a short robust ventrally directed subapical spur on ventral margin. Styles with

apical process slender, elongate, of approximately uniform width throughout length, tapering to short acute dorsally hooked apex, ventral margin mildly serrate over distal half. Aedeagus with shaft slender, directed dorsally and turned slightly anterodorsally distad of midlength, terminating in a pair of small lateral lobe-like expansions; a pair of slender dorsally directed processes basally, posterior to shaft, extending to near midlength of latter; gonopore and anterior incision relatively short, extending over apical one-fifth of shaft.

Remarks. This species is unique amongst those of this area in having basal processes on the aedeagus. It is mostly closely related to *dolon* from Borneo in the shape of the styles and pygophore processes and in having only a short gonopore and anterior incision on the aedeagus. It differs from *dolon*, however, in the specific shape of the style and pygophore process as well as the presence of the basal processes on the aedeagus.

Material examined

Holotype ♂, **Borneo**: Sarawak, foot of Mt Dulit, junction of rivers Tinjar and Lejok, 1.ix.1932 (*B. M. Hobby & A. W. Moore*) (BMNH).

Paratypes. **Borneo**: 9 ♂, Sabah and Sarawak (BMNH, BPBM).

Batracomorphus troilus sp. n.

(Figs 422–426)

Length: ♂, 4·88 mm.

Male genitalia. Pygophore processes slender, directed dorsoposteriorly, apical third abruptly angled more dorsally and slightly enlarged with row of variably sized teeth along ventrolateral margin, terminating apically in recurved anteromesally directed tooth. Styles with apical process of uniform width over basal two-thirds, distal third constricted to just before apex, abruptly tapered distally to short acute dorsally hooked apex. Aedeagus with shaft slender, directed dorsally; posterior margin produced as posteriorly directed keels on each side of midline over distal two-fifths; gonopore extending approximately one-fifth length of shaft; anterolateral margins of shaft produced subapically as laterally directed keel-like lobes on each side of short anterior incision.

Remarks. This species is similar to *dolon* from Borneo in having a relatively short gonopore and anterior incision, and posterior keels on the shaft but differs in having the posterior keels extending to near the midlength of the shaft, as in *teucer* which, however, has a much longer gonopore. It also resembles *dolon* and *teucer* in having teeth at the distal end of the pygophore processes but differs in their direction and distribution, as well as in the shape of the styles.

Material examined

Holotype ♂, **Borneo**: Sabah, Tenompok, 10–14.ii.1959 (*T. C. Maa*) (BPBM, Type No. 12,551).

Batracomorphus rorida (Linnavuori) comb. n.

(Figs 427–431)

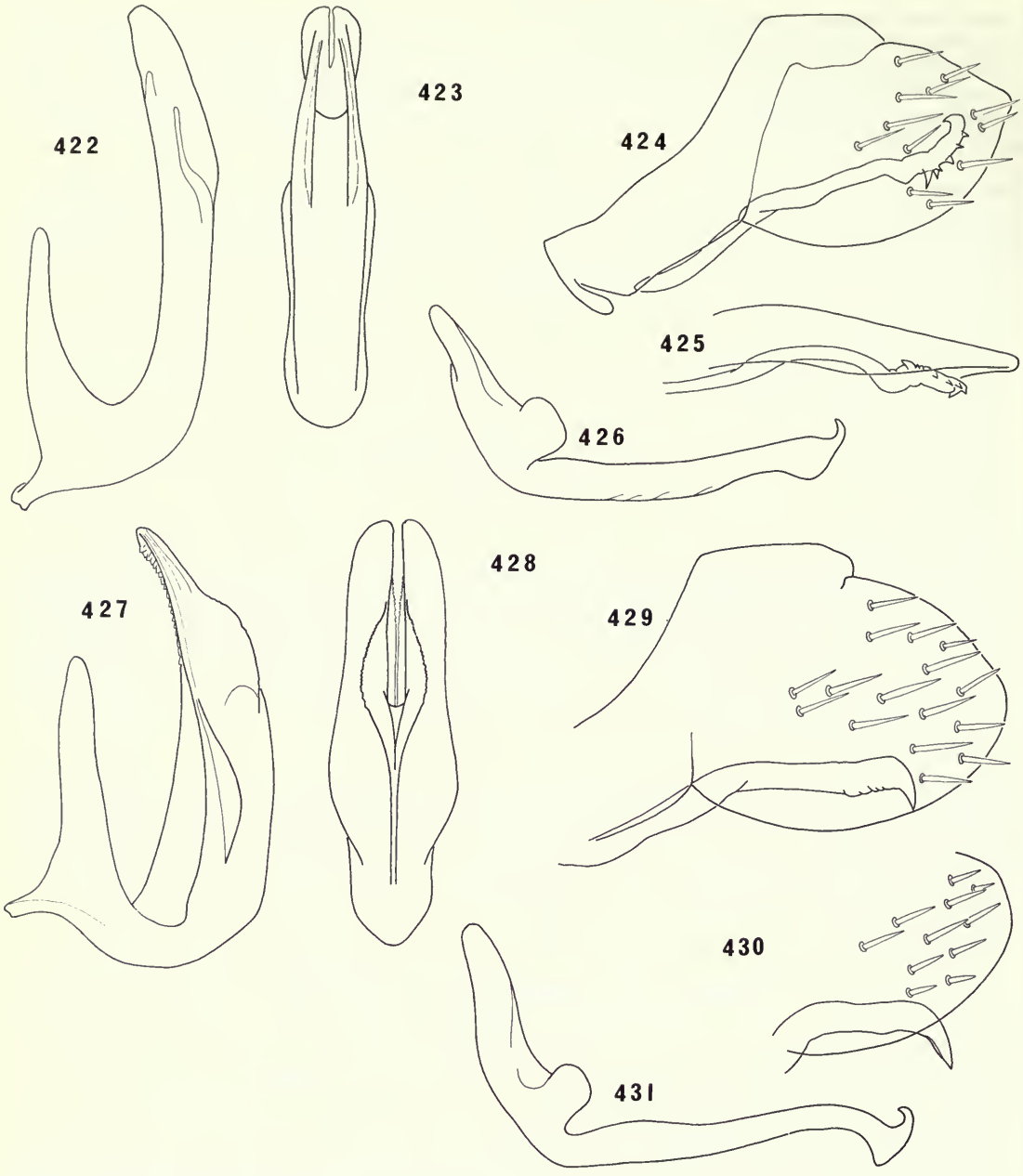
Stragania rorida Linnavuori, 1956: 181. Holotype ♂, Sumatra (NR) [examined].

Length: ♂, 4·96–5·04 mm (mean 5·00 mm).

Forewings with numerous small dark brown tubercles.

Male genitalia. Pygophore processes robust, directed posteriorly, apex acute, turned ventromesally. Styles with apical process slender, elongate, widest basally and then uniform in width to near apex, turned ventrad distally and terminating in short acute dorsally hooked apex, ventral margin with triangular expansion subapically. Aedeagus with shaft robust, directed dorsally, narrowing to apex in lateral aspect, broadly rounded apically in posterior aspect, lateral margins expanded keel-like with basal half of keels turned posteriorly, anterior margin acute, posterior margin expanded keel-like medially over basal half to base of gonopore, lateral margins of gonopore keel-like divergent to just basad of shaft apex; gonopore and anterior incision extending approximately two-fifths length of shaft.

Remarks. This species is one of several having keel-like expansions on the shaft of the aedeagus but differs from them all in the shape of the aedeagus, as well as the shape of the pygophore processes and styles. It is most similar to *erato* from the Philippines in having the lateral margins of the gonopore expanded and divergent and to *troilus* from Borneo in the shape of the styles.



Figs 422–431 422–426, *Batracomorphus troilus*. (422, 423) aedeagus; (424) pygophore; (425) left pygophore lobe and process, ventral view; (426) style. 427–431, *B. rorida* (Borneo specimen). (427, 428) aedeagus; (429) pygophore; (430) left pygophore lobe and process, posterolateral view; (431) style. (For further explanation see 'Techniques and methods'.)

DISTRIBUTION. Borneo*, Sumatra (* new record).

MATERIAL EXAMINED

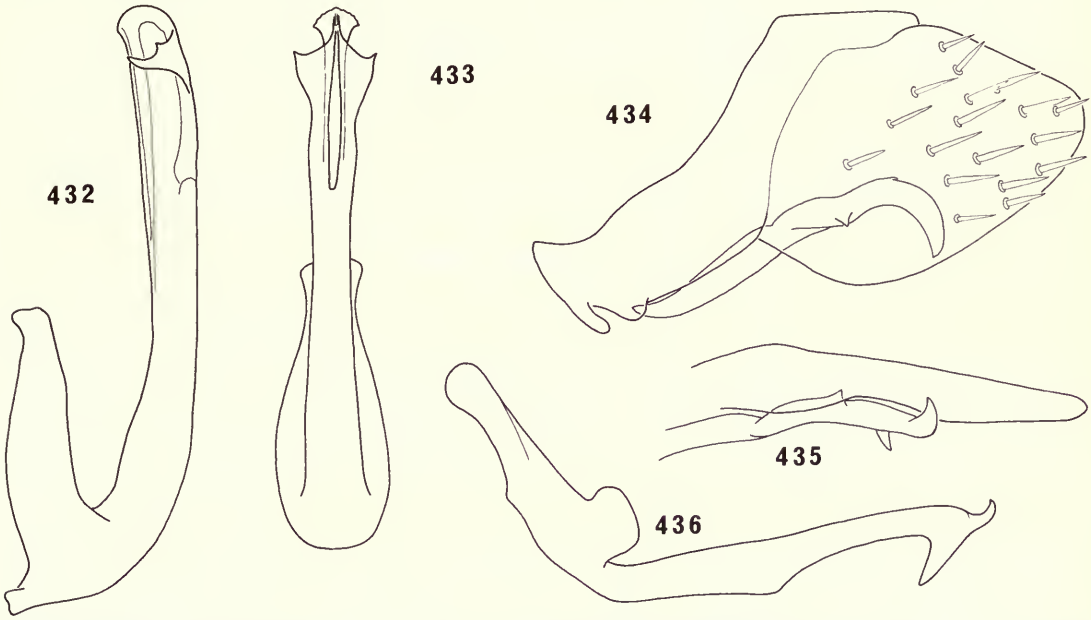
Stragania rorida Linnavuori, holotype ♂, **Sumatra**: Medan (*Mjöberg*) (NR).
Borneo: 25 ♂, Sabah and Sarawak (BMNH, BPBM).

Batracomorphus otus sp. n.

(Figs 432–436)

Length: ♂, 4·88 mm.

Male genitalia. Pygophore processes robust, directed posteriorly to midlength then curving ventrally, apex acute and turned laterally, a short spur on lateral margin near base and another on medial margin at midlength. Styles with apical process elongate, expanding gradually to near midlength then abruptly narrowed to slender distal half, terminating in acute dorsally hooked apex, a large triangular projection subapically on ventral margin. Aedeagus with shaft slender, elongate, directed dorsally, apex rounded in lateral aspect; a pair of triangular lamellate expansions subapically on posterior margin, curving anteriorly; anterior margin expanded at apex into pair of small divergent lamellate lobes; gonopore extending approximately one-third length of shaft; anterior incision very short.



Figs 432–436 *Batracomorphus otus*. 432, 433, aedeagus; 434, pygophore; 435, left pygophore lobe and process, ventral view; 436, style. (For further explanation see 'Techniques and methods'.)

Remarks. This species is one of a group of three (*otus, melampus* and *hector*) from West Malaysia, characterised by the general shape of the style, the short or obsolete anterior incision and lamellate outgrowths on the aedeagus, and the general shape of the pygophore processes. All three differ from each other by the detailed characters of their male genitalia, with *hector* being further distinguished by the presence of numerous dark brown tubercles on the forewings.

Material examined

Holotype ♂, **West Malaysia**: Pahang, Fraser's Hill, 1281 m, 4.vii.1931 (*H. M. Pendlebury*) (BMNH).

Batracomorphus melampus sp. n.

(Figs 437–441)

Length: ♂, 5·28 mm.

Male genitalia. Pygophore processes directed dorsoposteriorly, slightly expanded just prior to apex with latter acute and turned ventrally, a row of small lamellate teeth on ventrolateral margin over distal third. Styles with apical process expanding to just distad of midlength then abruptly narrowed; a large lamellate triangular expansion on ventral margin immediately distad of constriction and extending to short acute dorsally hooked apex. Aedeagus with shaft slender, elongate, directed dorsally and curving anterodorsally distally; anterolateral edges produced laterally as lamellate expansions over distal half of shaft; postero-

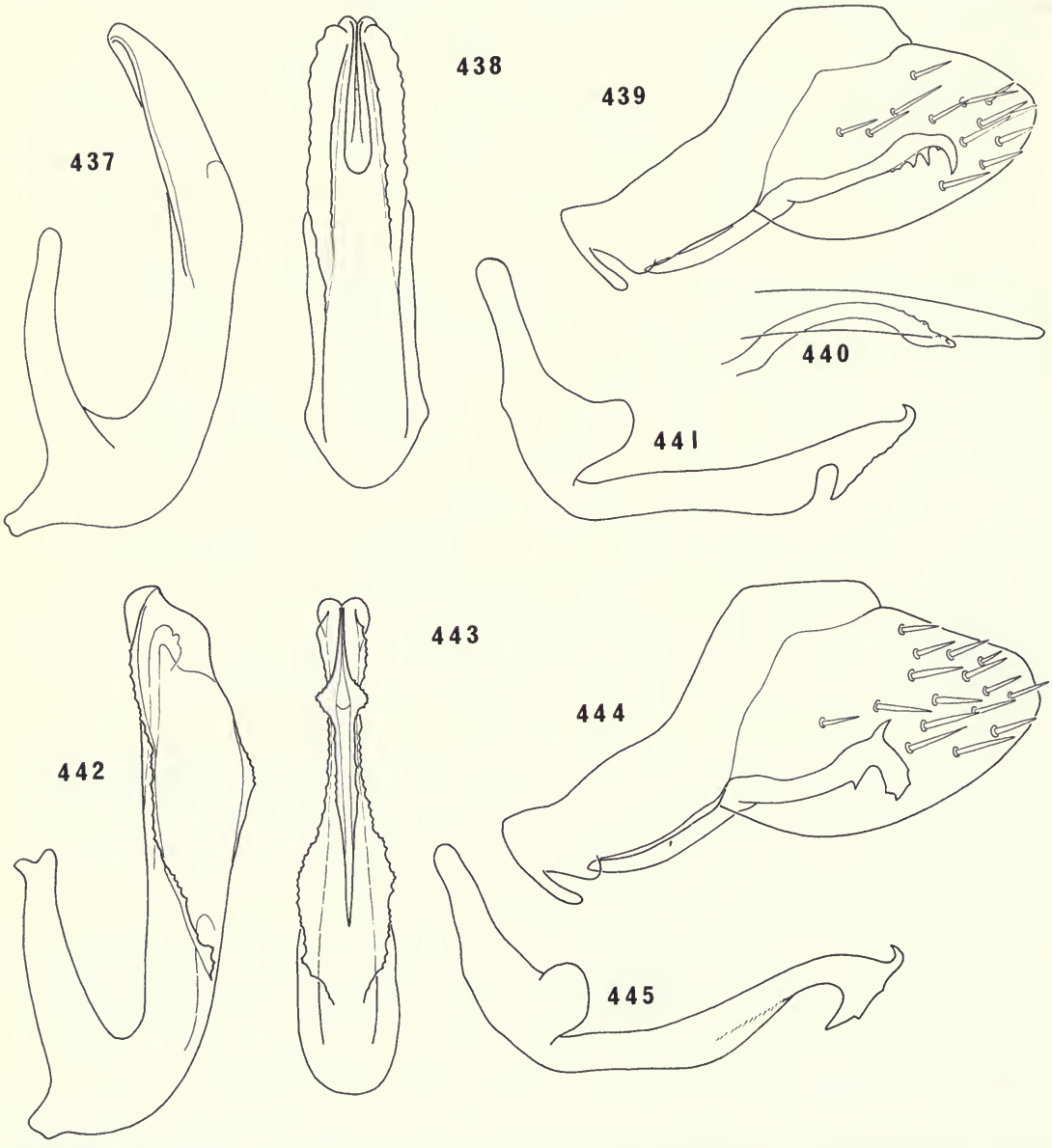
lateral edges of shaft acuminate; gonopore extending approximately one-third length of shaft; anterior incision extending approximately half length of gonopore.

REMARKS. See remarks under *otus*. This species is known only from north-western Malaya.

MATERIAL EXAMINED

Holotype ♂, **West Malaysia**: Pahang, Cameron Highlands, J.R., 1433 m, 16.v.1939 (*H. M. Pendlebury*) (BMNH).

Paratype. **West Malaysia**: 1 ♂ (BMNH).



Figs 437–445 437–441, *Batracomorphus melampus*. (437, 438) aedeagus; (439) pygophore; (440) left pygophore lobe and process, ventral view; (441) style. 442–445, *B. hector*. (442, 443) aedeagus; (444) pygophore; (445) style. (For further explanation see 'Techniques and methods'.)

Batracomorphus hector sp. n.

(Figs 442–445)

Length: ♂, 4·88 mm.

Forewings with numerous minute dark brown tubercles.

Male genitalia. Pygophore processes short, robust, directed posteriorly, distal half arched dorsally with apex spatulate, directed ventrally, rounded in lateral aspect and slightly serrate, a small lamellate spine on ventral margin approximately one-third distance from apex and a spur on dorsal margin at apex of arch. Styles with apical process increasing in width to midlength then tapering to short acute dorsally hooked apex; a robust ventrally directed triangular expansion subapically on ventral margin, its posterior edge slightly serrate. Aedeagus with shaft directed dorsally, becoming robust and laterally compressed over distal half; a marginally serrate lamellate expansion laterally over midlength region of shaft arising near posterolateral margin basally and extending diagonally to anterolateral margin and continuing as serrate crest to apex; posterior margin expanded flange-like on each side of midline to level of gonopore where produced as pair of triangular lamellate divergent expansions; gonopore short, extending approximately one-sixth length of shaft; anterior incision absent.

REMARKS. See remarks under *otus*.

MATERIAL EXAMINED

Holotype ♂, **West Malaysia**: Perak, Gunong Kledang, 808 m, 15.xi.1927 (*E. Seimund*) (BMNH).

Batracomorphus cronos sp. n.

(Figs 446–455)

Length: ♂, 5·60–5·92 mm (mean (5·69 mm).

Male genitalia. Pygophore processes filamentous, directed posteriorly, with or without one or more small subapical spurs on ventral margin. Styles with apical process slightly expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, turned slightly anterodorsally at midlength, a slight subapical constriction from posterior margin usually present, sometimes indistinct; gonopore and anterior incision of approximately equal length, extending to just basad of midlength of shaft.

REMARKS. The variability in the ornamentation of the pygophore processes occurs within populations and sometimes between the left and right side of the body. The pygophore processes, in the absence of subapical spurs, resemble those in *cocles, hebrus* and *calliope* but the present species differs from all three in the shape of the aedeagus and styles, as well as being larger. It is most closely related to *acrisius* from New Caledonia but is much larger and lacks a subapical keel on the pygophore processes.

MATERIAL EXAMINED

Holotype ♂, **New Hebrides**: Aneityum, Red Crest, 366 m, 4·8 km NE. of Anelgauhat, vi.1955 (*L. E. Cheesman*) (BMNH).

Paratypes. **New Hebrides**: 22 ♂, 9 ♀, Aneityum and Erromanga (BMNH, SAM).

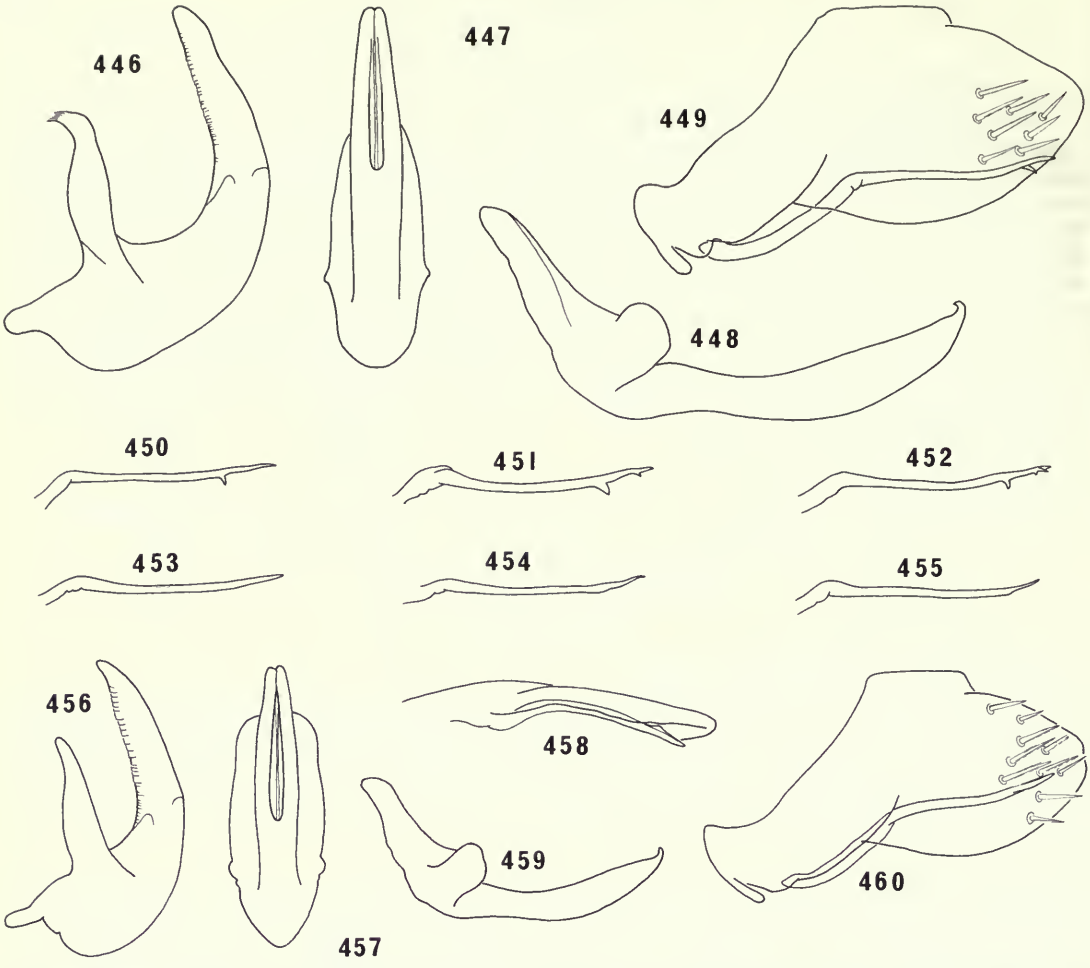
Batracomorphus acrisius sp. n.

(Figs 456–460)

Length: ♂, 3·60–3·76 mm (mean 3·68 mm).

Male genitalia. Pygophore processes slender, directed posteriorly, apex acute, lateral margin slightly keel-like subapically. Styles with apical process slightly expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, turned slightly anterodorsally over distal half; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. This species is similar to *hebrus* from New Caledonia, *sarpedon* from Australia and *cronos* from New Hebrides in the general shape of the pygophore processes but differs from all three in having a subapical keel on the process. It is also much smaller than these other species and, in addition, lacks the dark brown spots on the forewings present in the Australian species. It



Figs 446–460 446–455, *Batracomorphus cronos*. (446, 447) aedeagus; (448) style; (449) pygophore; (450–455) left pygophore process, left lateral views. 456–460, *B. acrisius*. (456, 457) aedeagus; (458) left pygophore lobe and process, ventral view; (459) style; (460) pygophore. (For further explanation see 'Techniques and methods'.)

differs further from *sarpedon* in the shape of the style, from *cronos* in the shape of the aedeagus, and from *hebrus* in the shape of both these structures.

MATERIAL EXAMINED

Holotype ♂, **New Caledonia**: Noumea, 0–50 m, 7.ii.1971 (*N. L. H. Krauss*) (USNM).
Paratypes. **New Caledonia**: 1 ♂, 4 ♀, same data as holotype.

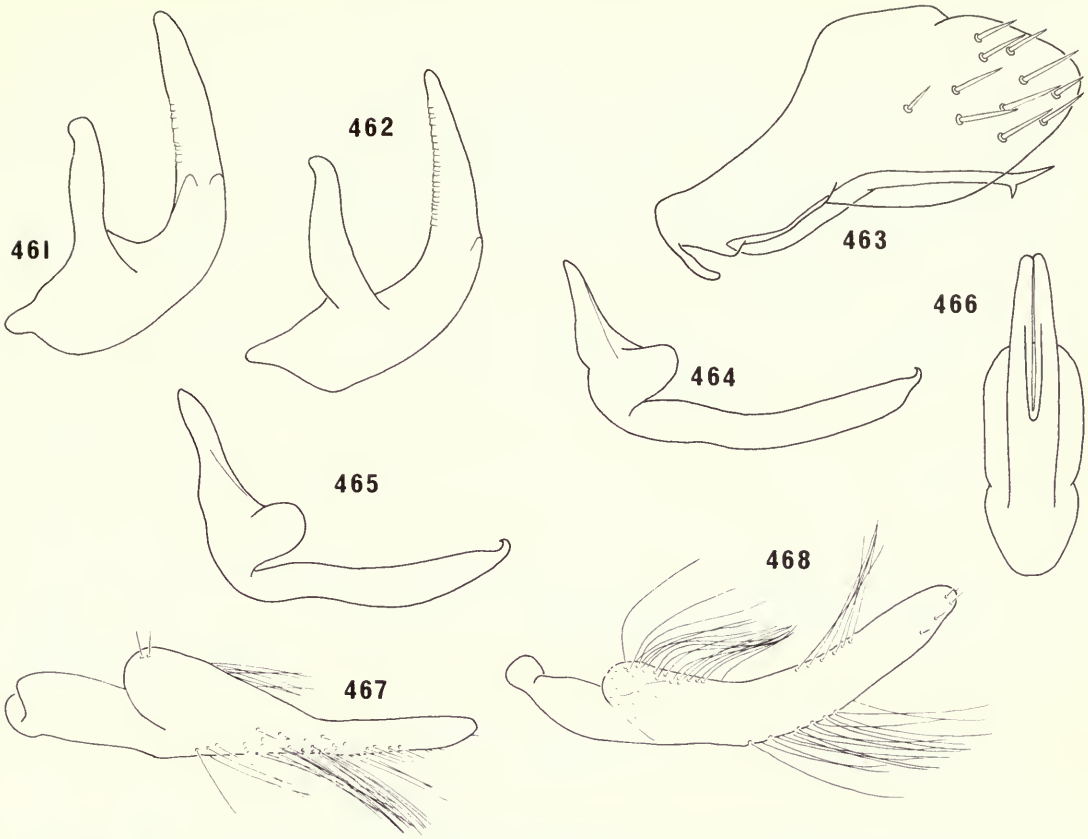
Batracomorphus harpago Linnavuori

(Figs 461–492)

Batrachomorphus harpago Linnavuori, 1960*a*: 240. Holotype ♂, KUSAIE (USNM) [examined].

Length: ♂, 4·00–4·64 mm (mean 4·36 mm).

Male genitalia. Pygophore processes slender, directed posteriorly, apex acute and usually slightly upturned, rarely directed posteriorly, a small subapical spur on ventral margin, the portion of the process distad of spur usually longer than spur, rarely equal to or less than. Subgenital plates semi-membranous, elongate, with stem and lateral lobe basally; a group of long hair-like setae on dorsolateral margin of lobe; a



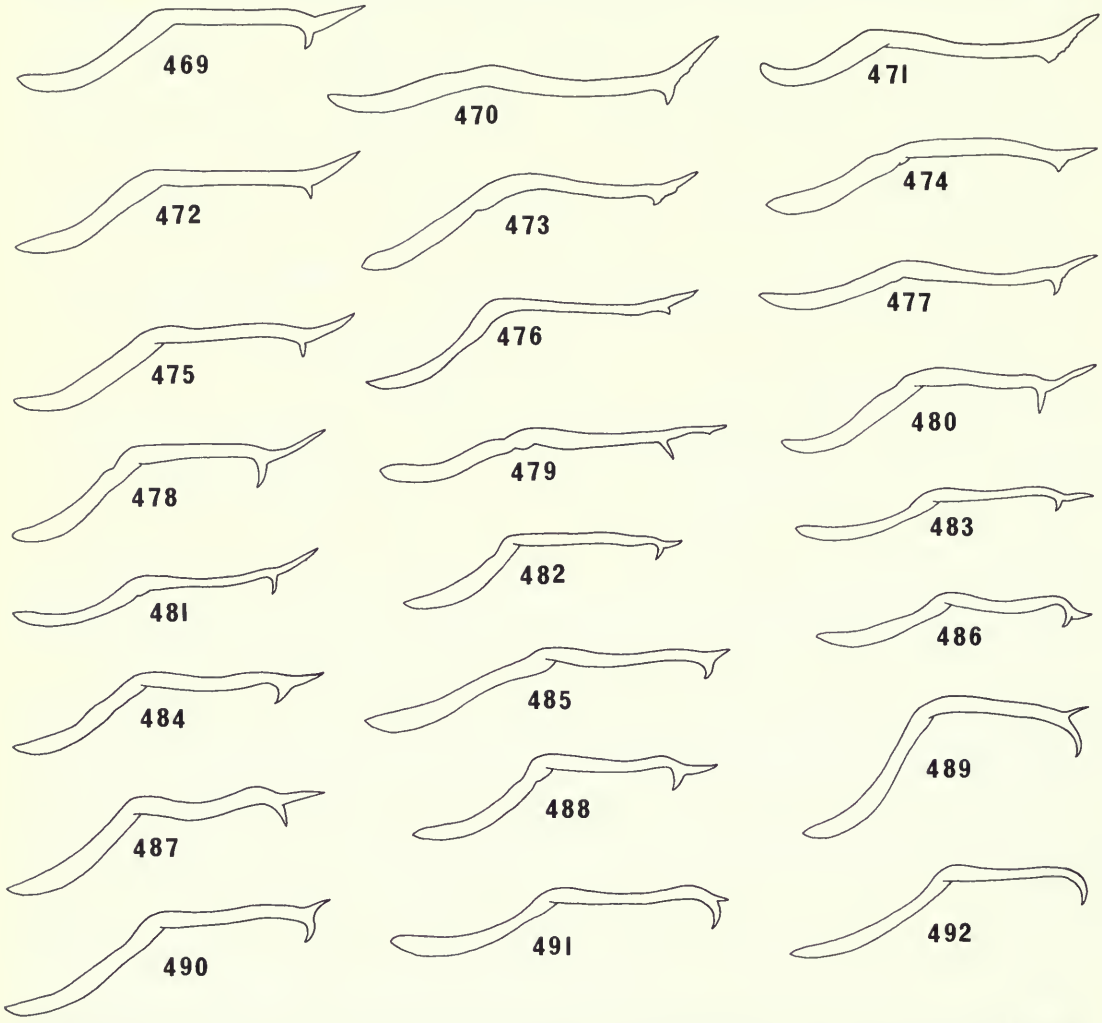
Figs 461–468 *Batracomorphus harpago*. 461, aedeagus Type B (Aneityum, New Hebrides); 462, aedeagus Type A (Guadalcanal, Solomon Islands); 463, pygophore Type A (Aneityum); 464, style Type B (Aneityum); 465, style Type A (Guadalcanal); 466, aedeagus; 467, left subgenital plate, ventral view; 468, same, left lateral view. (For further explanation see 'Techniques and methods' and text.)

short uniseriate row of long hair-like setae on dorsolateral margin near midlength; a multiseriate row of long hair-like setae on ventral margin near midlength, extending also over medial surface of plate. Styles with apical process usually slightly expanded over distal half, tapering to short acute dorsally hooked apex, rarely with apical process of uniform width and tapering abruptly subapically. Aedeagus simple; shaft directed dorsally, usually tapering to apex from near midlength in lateral aspect, rarely of uniform width in lateral aspect; gonopore extending to just basad of midlength of shaft; anterior incision equal in length to gonopore.

Remarks. The most common form of the aedeagus (type A), in which the shaft is tapered towards the apex, occurs in 71 per cent of the 196 specimens examined and is distributed throughout the range except for New Ireland and Kusaie in the north and Erromanga, Tanna and Aneityum at the southern extremity. The remaining 29 per cent, in which the shaft of the aedeagus is of approximately uniform width (type B), is distributed throughout the entire range, from Kusaie to Aneityum. In the case of the styles, the most common form (73 per cent) has the apical process slightly expanded over its distal half and tapered gradually to the apex (type A). This form occurs throughout the range of the species except for Kusaie in the north and Efate, Erromanga, Tanna and Aneityum in the south. The other form of the style (type B), in which the apical process is of uniform width, occurs in the remaining 27 per cent of the specimens examined and is distributed throughout the entire range, from Kusaie to Aneityum. The two forms of the aedeagus are associated with those of the styles in all four possible combinations, the most common (65 per cent) being aedeagus type A with style type A which occurs from New

Britain to Malekula. The next most common combination (20 per cent) is aedeagus type B with style type B which occurs throughout the entire range from Kusaie to Aneityum. Of the other two possible combinations, aedeagus type A with style type B (7 per cent) occurs from Fauro to Efate and aedeagus type B with style type A (8 per cent) occurs from New Ireland to San Cristoval. There is no correlation between the two forms of aedeagus and style, or their various combinations, and the variability of the pygophore processes, representatives from the full range of the latter occurring with each of the aedeagus/style combinations.

The variability in the shape of the pygophore processes, which sometimes occurs in the same population, is shown in Figs 463 and 469–492. The usual form, in which the portion distad of the



Figs 469–492 *Batracomorphus harpago,* left pygophore process, left lateral view. 469, Type B, Malekula, New Hebrides; 470, Type I, Espiritu Santo, New Hebrides; 471, Type J, Aneityum, New Hebrides; 472, Type C, Malekula; 473, Type K, Aneityum; 474, Type L, Aneityum; 475, Type D, Malekula; 476, Type M, Santa Ysabel, Solomon Islands; 477, Type N, New Ireland; 478, Type E, Malekula; 479, Type G, Tanna, New Hebrides; 480, Type H, Erromanga, New Hebrides; 481, Type F, Rennell Island; 482, Type O, San Cristoval, Solomon Islands; 483, Type P, Guadalcanal, Solomon Islands; 484, Type Q, Santa Ysabel; 485, Type R, Santa Ysabel; 486, Type S, Florida Group, Solomon Islands; 487, Type T, Malaita, Solomon Islands; 488, Type U, Santa Ysabel; 489, Type V, Santa Ysabel; 490, Type W, Nggela Island, Florida Group; 491, Type X, Gizo Island, New Georgia Group, Solomon Islands; 492, Type Y, Gizo Island. (For further explanation see text.)

spur is longer than the spur itself, occurs in 68 per cent of the specimens examined, the most common of these being type D which occurs in 26 per cent of specimens. The closely similar forms (types A–J) occur in 62 per cent of specimens. All forms of the pygophore process occur throughout the full range of the species with the exception that those in which the portion of the process distad of the spur is equal to or less than the spur itself (types O–Y), are confined to the Solomon Islands and although occasionally found in New Britain do not occur in the New Hebrides. There is no correlation between the form of the pygophore process and the shape of the aedeagus and styles, all combinations of the latter occurring with the different types of process.

The great variability in this species appears to be a result of its distribution along the two island chains of the Solomons and New Hebrides and its consequent fragmentation into distinct populations. The greater variability of the pygophore processes in the Solomon Islands suggests that the species has occurred there for a far longer period than in the New Hebrides.

DISTRIBUTION. Kusaie, New Britain*, New Hebrides*, New Ireland*, Solomon Islands* (* new records).

MATERIAL EXAMINED

Batrachomorphus harpago Linnavuori, holotype ♂, **Kusaie**: Mt Matante, 380 m, 23.iv.1953 (*J. F. G. Clarke*) (USNM).

New Britain: 6 ♂, 4 ♀ (BPBM). **New Hebrides**: 46 ♂, 19 ♀, Aneityum, Efate, Erromanga, Espiritu Santo, Malekula and Tanna (BMNH, BPBM, SAM, USNM). **New Ireland**: 3 ♂, 1 ♀ (BMNH, ZM). **Solomon Islands**: 200 ♂, 96 ♀, Big Nggela, Bougainville, Buka, Choiseul, Fauro, Gizo, Guadalcanal, Kolombangara, Malaita, Nggela, Rennell, San Cristoval, Santa Ysabel, Small Nggela and Vella Lavella (BMNH, BPBM, USNM).

Batracomorphus juno sp. n.

(Figs 493–503)

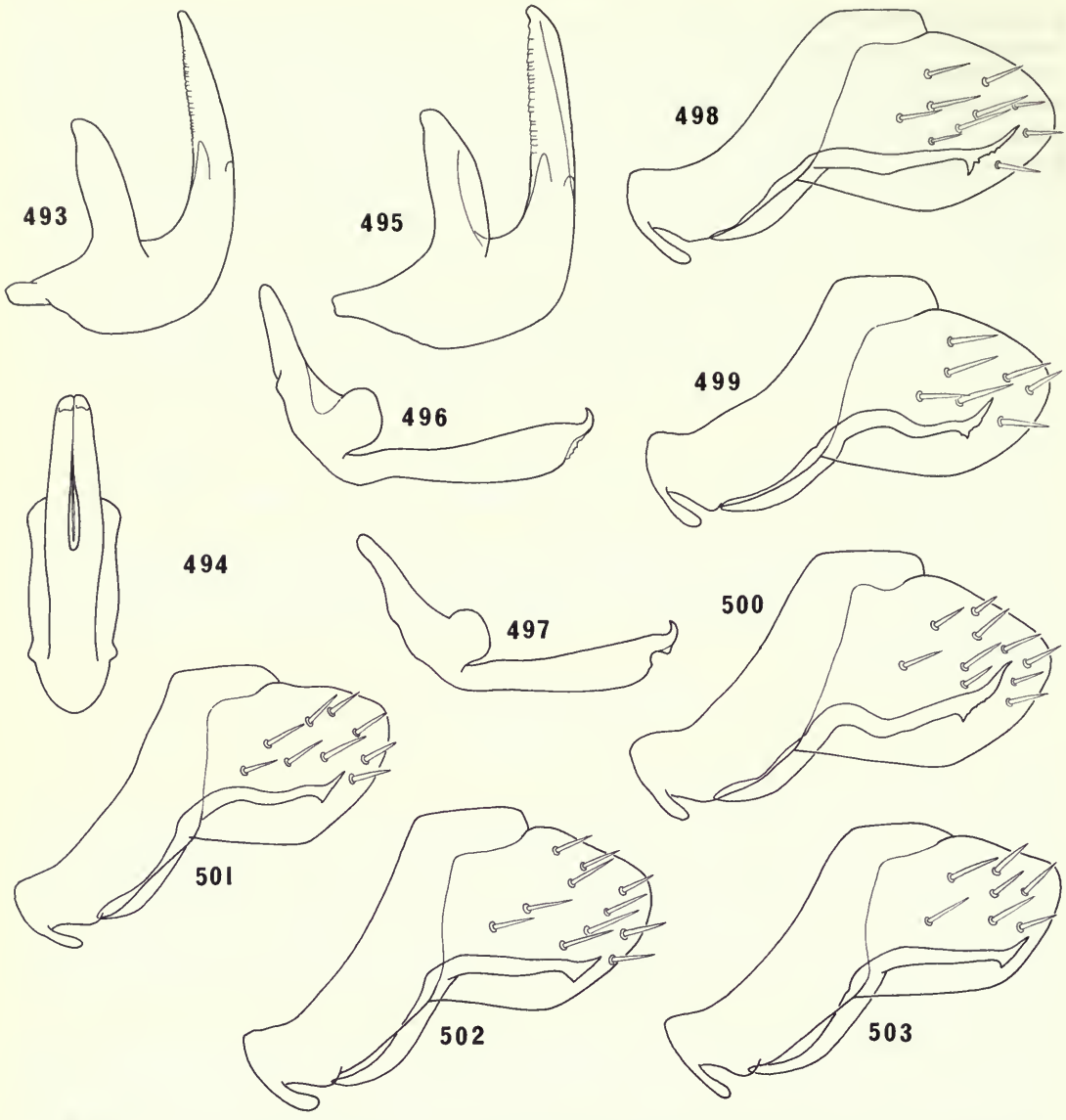
Length: ♂, 3·92–4·56 mm (mean 4·13 mm).

Male genitalia. Pygophore processes slender, directed posteriorly, straight or slightly sinuate, apex acute, turned posterodorsally, ventral margin acutely ridged subapically, sometimes slightly serrate, the more basad part sometimes produced spur-like, variable in relative length of process distad of spur. Styles with apical process increasing gradually in width posteriorly, abruptly narrowed subapically to short acute dorsally hooked apex, ventral margin of subapical constriction acutely ridged. Aedeagus simple; shaft directed dorsally, usually of uniform width, rarely tapered to apex over distal half; gonopore extending approximately two-thirds length of shaft; anterior incision slightly shorter than gonopore, extending to near midlength of shaft.

REMARKS. The variability of the present species in the shape of the pygophore processes occurs throughout the full range of the species and shows little evidence of a geographical cline. The usual form, illustrated as type A, occurs in all known Philippine localities but is replaced in Sabah and West Malaysia by the more robust and sinuate form, type B, which is also found in Palawan, Busuanga and Luzon. Type F, a form somewhat intermediate between type A and type B, occurs in Sabah, Mindanao and Luzon. Type C, a form similar to type F but without serrations on the subapical ventral margin, is found in the same localities as type F and in addition in Palawan. Types D and E, both of which are similar to type C but straight rather than sinuate, are known only on Tawi Tawi.

Variation in the shape of the aedeagus and styles is much less than in the pygophore processes. The usual shape of the aedeagus is that illustrated for Palawan in which the shaft is of approximately uniform width. This is found in all localities whilst the tapered form illustrated for Borneo and West Malaysia is found in only a few of the specimens from these two areas. The normal shape of the style, illustrated for Palawan, likewise occurs in all localities whilst the more abruptly constricted form is known in only one specimen from Borneo and two from West Malaysia.

This species resembles *harpago* but differs in the shape of the style, the relative lengths of the gonopore and anterior incision and in having a more sinuate pygophore process in the majority



Figs 493–503 *Batracomorphus juno*. 493, 494, aedeagus (Borneo); 495, aedeagus, usual shape (Palawan); 496, style, usual shape (Palawan); 497, style (Borneo); 498, pygophore, Type A; 499, same, Type F; 500, same, Type B; 501, same, Type C; 502, same, Type D; 503, same, Type E. (For further explanation see 'Techniques and methods' and text.)

of specimens. It is also similar to *numitor* from the Philippines but differs likewise in having a more sinuate pygophore process and a more robust style. It differs from the closely related species *punctatus* from Christmas Island in the Indian Ocean principally in the relative width of the head which in the present species is narrower than the pronotum, as normal for the genus. The species *punctatus* is unusual in having the head as wide as or wider than the pronotum and the eyes more prominent than normal. The two species also differ slightly in the shape of the style, that of *juno* being more abruptly constricted apically.

Material examined

Holotype ♂, **Philippines**: Palawan, P. Princesa (*Baker*) (USNM).

Paratypes. **Borneo**: 26 ♂, Sabah (BMNH, BPBM). **Philippines**: 40 ♂, 8 ♀, Balabac, Busuanga, Culion, Luzon, Mindanao, Palawan and Tawi Tawi (AMNH, BPBM, FMNH, ZM). **West Malaysia**: 2 ♂, 1 ♀ (BMNH).

Batracomorphus punctatus (Kirby) **comb. n.**

(Figs 504–507)

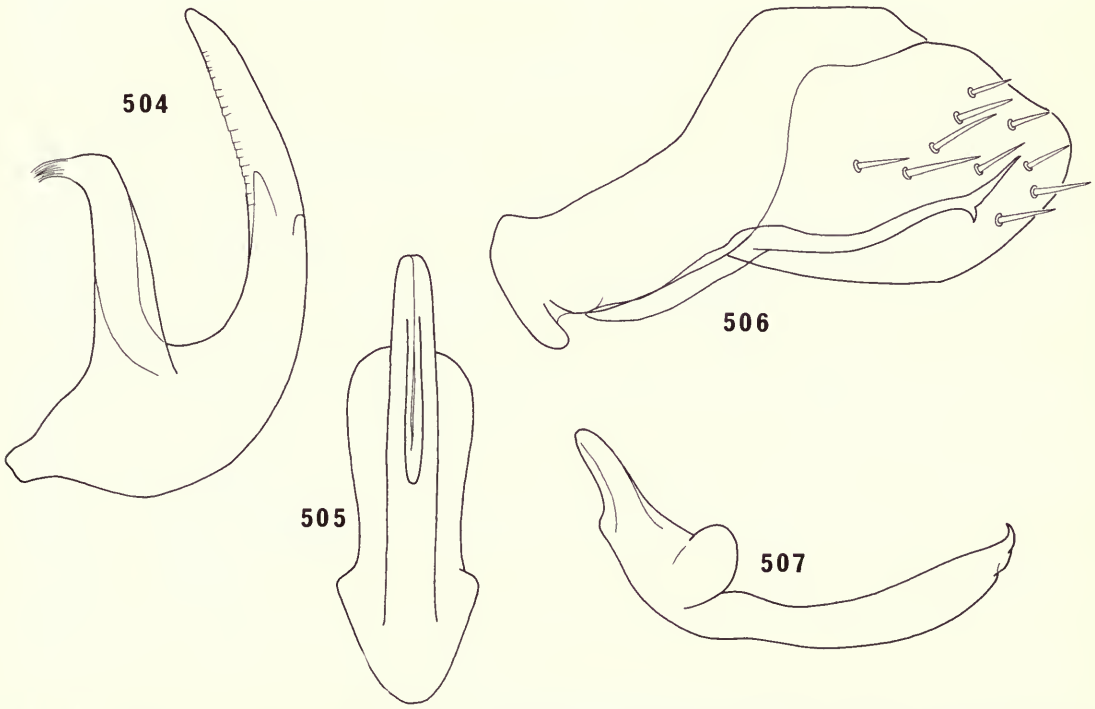
Idiocerus(?) *punctatus* Kirby, 1900: 138. Holotype ♂, Christmas Island (BMNH) [examined].

Length: ♂, 4·32–4·56 mm (mean 4·40 mm).

Head as wide as or wider than pronotum, eyes more prominent than normal.

Male genitalia. Pygophore processes slender, directed posteriorly to midlength and then dorsoposteriorly, slightly sinuate, apex acute, a small subapical spur on ventral margin. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex, ventral margin acuminate subapically. Aedeagus simple; shaft directed dorsally, turning slightly anterodorsally at midlength; gonopore extending to just basad of midlength of shaft; anterior incision slightly shorter than gonopore.

Remarks. This species, known only from Christmas Island in the Indian Ocean, differs from normal in having the head as wide as or wider than the pronotum and the eyes more prominent. It is closely related to *juno* in the shape of the male genitalia but differs in having the style less abruptly constricted apically.



Figs 504–507 *Batracomorphus punctatus*. 504, 505, aedeagus; 506, pygophore; 507, style. (For further explanation see 'Techniques and methods'.)

Distribution. Christmas Island (Indian Ocean).

Material examined

Idiocerus punctatus Kirkby, holotype ♂, **Christmas Island**: Flying Fish Cove, x.1897 (*C. W. Andrews*) (BMNH).

Christmas Island: 3 ♂, 8 ♀ (BMNH).

Batracomorphus numitor sp. n.

(Figs 508–512)

Length: ♂, 4·40–4·56 mm (mean 4·46 mm).

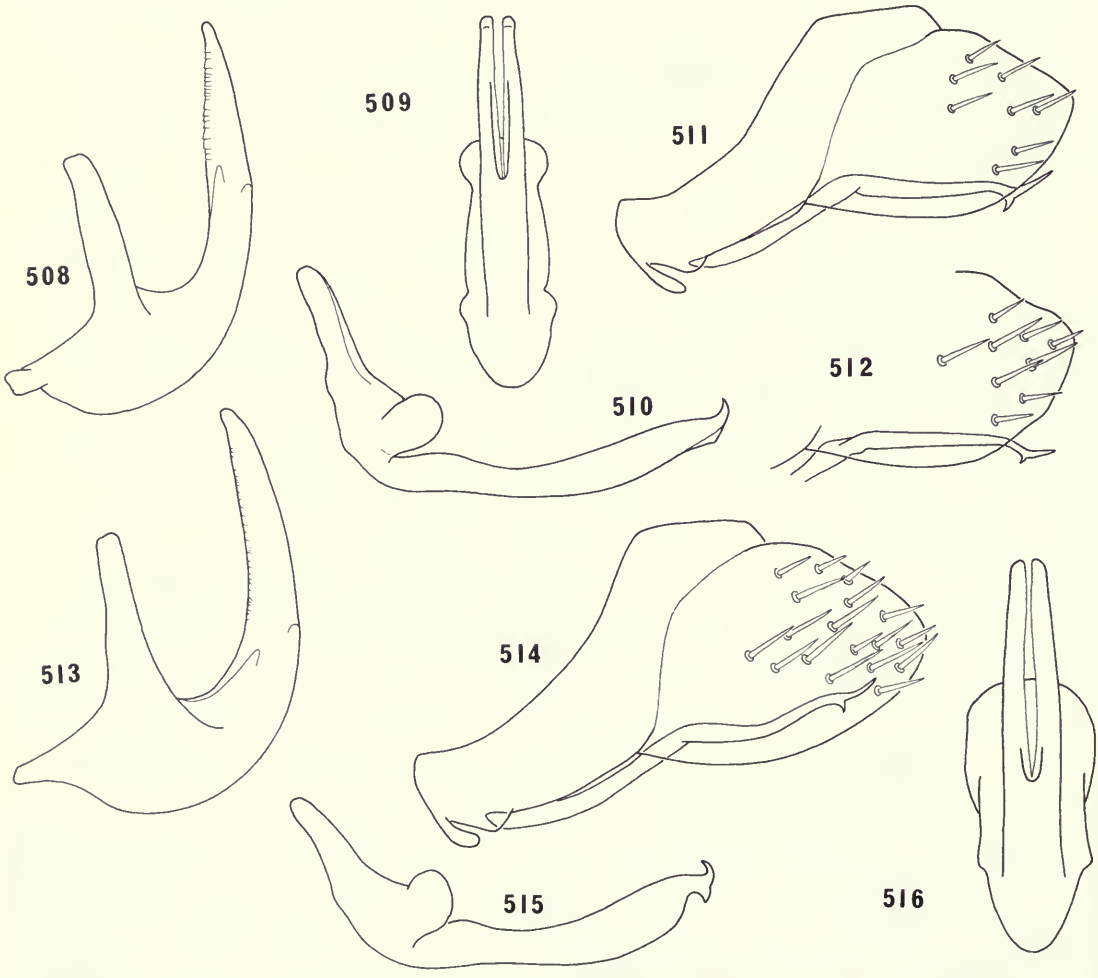
Male genitalia. Pygophore processes slender, directed posteriorly, apex acute and slightly upturned, a short spur-like projection subapically on ventral margin. Style with apical process elongate, uniform in width or slightly expanded over distal half, tapering to short acute dorsally hooked apex, ventral margin acutely ridged subapically and slightly extended as small lamellate lobe. Aedeagus simple; shaft slender, directed dorsally, tapering to apex; gonopore extending to approximately midlength of shaft; anterior incision slightly shorter than gonopore.

Remarks. The pygophore processes in this species are slightly variable, as illustrated, within the same population. The species is similar to *harpago* but has a more elongate aedeagus and style with a subapical expansion on the latter.

Material examined

Holotype ♂, **Philippines**: Luzon, Mt Makiling (*Baker*) (USNM).

Paratypes. **Philippines**: 4 ♂, same data as holotype (USNM).



Figs 508–516 508–512, *Batracomorphus numitor*. (508, 509) aedeagus; (510) style; (511) pygophore; (512) same, same population. 513–516, *B. ixion*. (513) aedeagus; (514) pygophore; (515) style; (516) aedeagus. (For further explanation see 'Techniques and methods'.)

Batracomorphus ixion sp. n.

(Figs 513–516)

Length: ♂, 4·96 mm.

Pronotum and scutellum speckled with variably sized dark brown spots; forewings speckled with larger reddish brown blotches.

Male genitalia. Pygophore processes slender, directed posteriorly to midlength then turned slightly dorsoposteriorly, tapering to acute slightly upturned apex, a small subapical spur on ventral margin. Styles with apical process expanded over distal half, abruptly narrowed subapically to short acute dorsally hooked apex, a small subapical triangular expansion on ventral margin. Aedeagus simple; shaft slender, directed dorsally, tapering slightly to apex; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. This species is similar to *mettus* from Sarawak but has a more elongate aedeagus with the gonopore and anterior incision extending more basad, the style more expanded distally and the pygophore processes turned more abruptly dorsoposteriorly at midlength. It also differs from *mettus* in being larger and having dark brown and reddish brown speckling on the pronotum, scutellum and forewings. It is similar also to *tarpeia* from New Britain but differs from this species also in size and external markings as well as having a more robust style and a more slender and sinuate pygophore process.

MATERIAL EXAMINED

Holotype ♂, **New Britain**: Gazelle Peninsula, Mt Sinewit, 900 m, 5–14.xi.1962 (*J. Sedlacek*) (BPBM, Type No. 12,552).

Batracomorphus maia sp. n.

(Figs 517–520)

Length: ♂, 4·56–5·12 mm (mean 4·97 mm).

Male genitalia. Pygophore processes slender, directed posteriorly, distal third slightly upturned, apex acute, a small lamellate projection usually present on ventral margin approximately one-fourth to one-third the distance from apex. Styles with apical process expanded over distal half, abruptly narrowed approximately one-fifth of distance from apex then tapered to short acute dorsally hooked apex, ventral margin with small lamellate expansion subapically. Aedeagus simple; shaft directed dorsally; gonopore and anterior incision extending approximately two-thirds length of shaft.

REMARKS. This species is similar to *pilumnus* from Borneo and *tyndareus* from Australia in the shape of the pygophore processes but differs from both in the shape of the style and the relative length of the gonopore and anterior incision. It is also larger than either of these two species and differs from *tyndareus*, in addition, in lacking dark brown spots on the forewings. It is similar also to *mettus* from Borneo but differs in having the subapical projection on the pygophore process lamellate rather than spine-like, the anterior incision of the aedeagus shorter than the gonopore and the apical process of the style more abruptly constricted subapically.

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Luzon, Camarines Sur, Mt Isarog, 21–22.v.1963 (*H. M. Torrevillas*) (BPBM, Type No. 12,553).

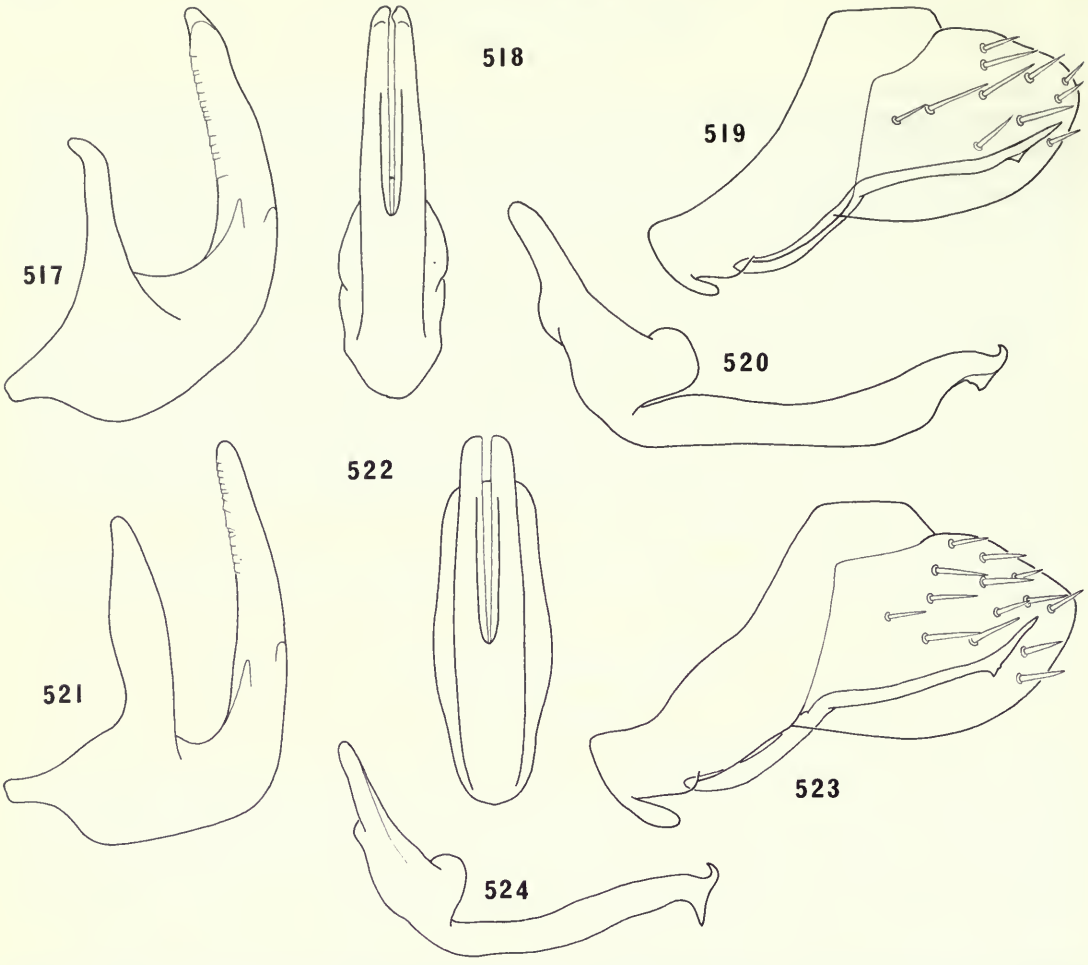
Paratypes. **Philippines**: 12 ♂, 1 ♀, Luzon (BPBM).

Batracomorphus pilumnus sp. n.

(Figs 521–524)

Length: ♂, 4·24–4·48 mm (mean 4·36 mm).

Male genitalia. Pygophore processes slender, directed posteriorly and slightly dorsally with distal portion turned slightly more dorsad, apex acute, a small triangular spur usually present subapically on ventral margin. Styles with apical process of uniform width, terminating in short acute dorsally hooked apex, a triangular projection subapically on ventral margin. Aedeagus simple; shaft slender, directed dorsally, tapering slightly to apex; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.



Figs 517–524 517–520, *Batracomorphus maia*. (517, 518) aedeagus; (519) pygophore; (520) style. 521–524, *B. pilumnus*. (521, 522) aedeagus; (523) pygophore; (524) style. (For further explanation see 'Techniques and methods'.)

Remarks. This species is similar to *tyndareus* from Australia but differs in having the aedeagus more rectangular basally, the apical process of the style less constricted immediately basad of subapical projection and in the absence of dark brown spots on the forewings.

Material examined

Holotype ♂, **Borneo**: Sabah, Tawau, Quoin Hill, 15–20.vii.1962 (*H. Holtmann*) (BPBM, Type No. 12,554).

Paratypes. **Borneo**: 46 ♂, Sabah and Sarawak (BMNH, BPBM).

Batracomorphus tyndareus sp. n.

(Figs 525–529)

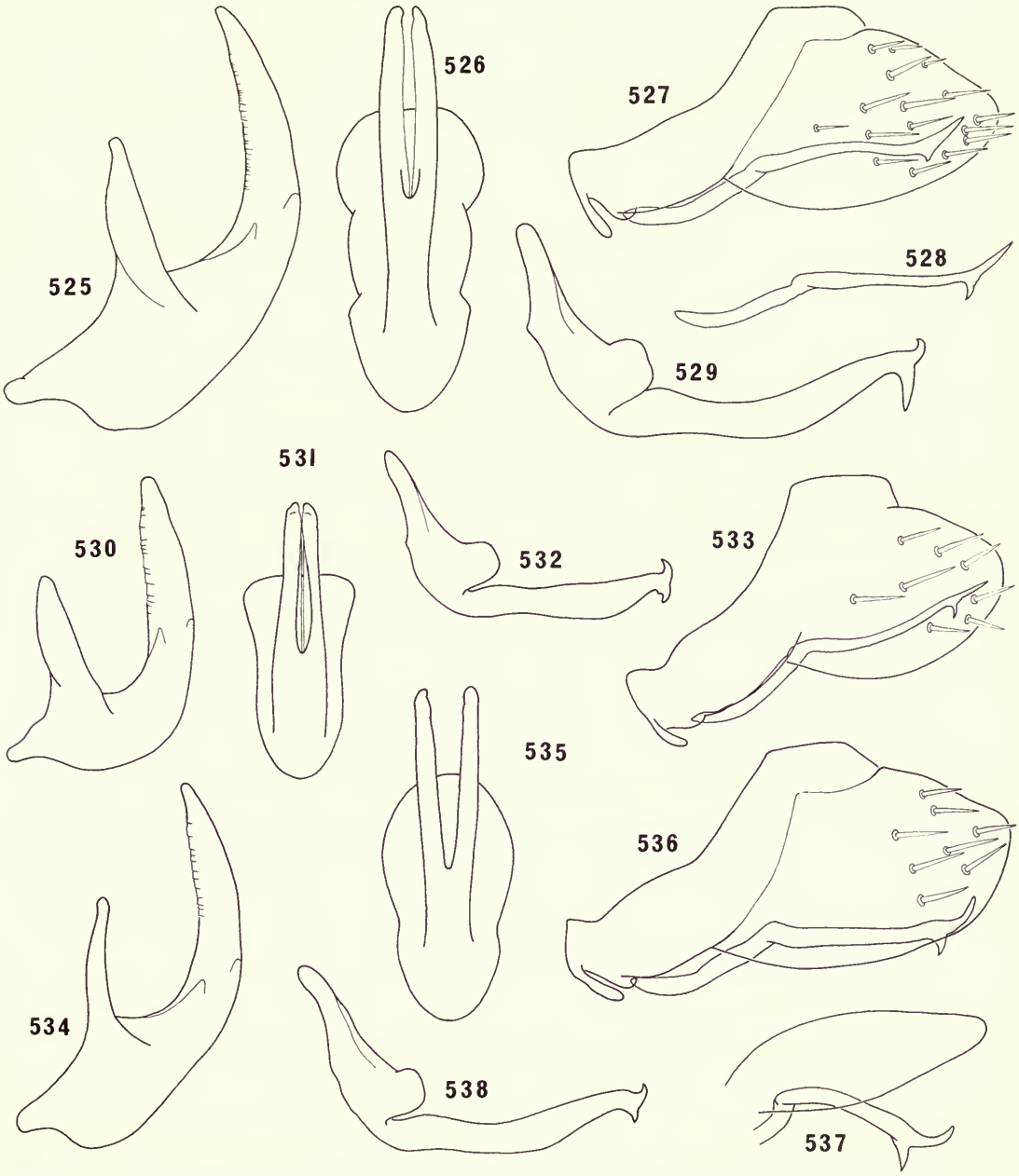
Length: ♂, 4·32–4·64 mm (mean 4·43 mm).

Forewings with small dark brown spots.

Male genitalia. Pygophore processes slender, directed posteriorly with distal portion turned dorsoposteriorly, apex acute, a ventral spur-like projection subapically with ventral margin between it and apex acuminate. Styles with apical process of approximately uniform width to just distad of midlength then tapering to short acute dorsally hooked apex, a large ventrally directed thorn-like projection subapically on

ventral margin. Aedeagus simple; shaft directed dorsally and curving slightly anterodorsally from midlength, tapering to apex; gonopore extending to just basad of midlength of shaft; anterior incision slightly longer than gonopore.

Remarks. This species is similar to *pilumnus* from Borneo but with the aedeagus less angular in lateral aspect, apical process of style more tapered over distal half and with dark brown spots on



Figs 525–538 525–529, *Batracomorphus tyndareus*. (525, 526) aedeagus; (527) pygophore; (528) left pygophore process, left lateral view; (529) style. 530–533, *B. mettus*. (530, 531) aedeagus; (532) style; (533) pygophore. 534–538, *B. tarpeia*. (534, 535) aedeagus; (536) pygophore; (537) left pygophore lobe and process, posterolateroventral view; (538) style. (For further explanation see 'Techniques and methods'.)

the forewings. It is similar also to *latinus* from New Britain but is much smaller, has dark brown spots on the forewings and the subapical projection on the style more slender. It shows greatest similarity to *tarpeia* from New Britain but has a much larger subapical process on the style.

MATERIAL EXAMINED

Holotype ♂, **Australia**: Queensland, Hann River Crossing, 106 m, 28.viii.1948 (*L. J. Brass*) (AMNH).
Paratypes. **Australia**: 5 ♂, Queensland (AMNH, BPBM, UQ).

Batracomorphus mettus sp. n.

(Figs 530–533)

Length: ♂, 4·64 mm.

Male genitalia. Pygophore processes filamentous, directed posterodorsally, apex acute, with small subapical spur on ventral margin. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex, a short subapical projection on ventral margin. Aedeagus simple; shaft directed dorsally; gonopore extending to approximately midlength of shaft; anterior incision approximately same length as gonopore.

REMARKS. This species is similar to *ixion* from New Britain but is slightly smaller and lacks the dark brown spots on the dorsum. The aedeagus in the present species is also less curved and more rectangular basally, the gonopore and anterior incision of approximately equal length and the apical process of the style and the pygophore processes less sinuate.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sarawak, Mt Dulit, 1220 m, moss forest, 25.x.1932 (*B. M. Hobby & A. W. Moore*) (BMNH).

Batracomorphus tarpeia sp. n.

(Figs 534–538)

Length: ♂, 4·40 mm.

Forewings speckled with small variably sized dark brown spots.

Male genitalia. Pygophore processes slender, directed posteriorly and curving mesally from midlength, apex acute and upturned, a spur-like projection subapically on ventral margin. Styles with apical process slender, slightly expanded at midlength, tapering to short acute dorsally hooked apex, a small triangular expansion subapically on ventral margin. Aedeagus simple; shaft slender, directed dorsally and curving slightly anterodorsally, tapering to apex in lateral aspect; gonopore extending approximately two-thirds length of shaft; anterior incision slightly longer than gonopore.

REMARKS. This species is similar to *ixion* from New Britain but is smaller, lacks dark brown spots on the pronotum and scutellum and has different markings on the forewings. The aedeagus and styles are also less robust and the pygophore processes less sinuate and more robust. It also resembles *latinus* from New Britain but is much smaller and has dark brown spots on the forewings. It differs from *latinus* also in having the shaft of the aedeagus more tapered distally, the subapical projection on the style relatively smaller and the pygophore processes less sinuate and without subapical serrations on the ventral margin.

MATERIAL EXAMINED

Holotype ♂, **New Britain**: Silanga, Nakanai Mts, 150 m, 1.viii.1956 (*E. J. Ford Jr*) (BPBM Type No. 12,555).
Paratypes. **New Britain**: 3 ♀, same data as holotype (BPBM).

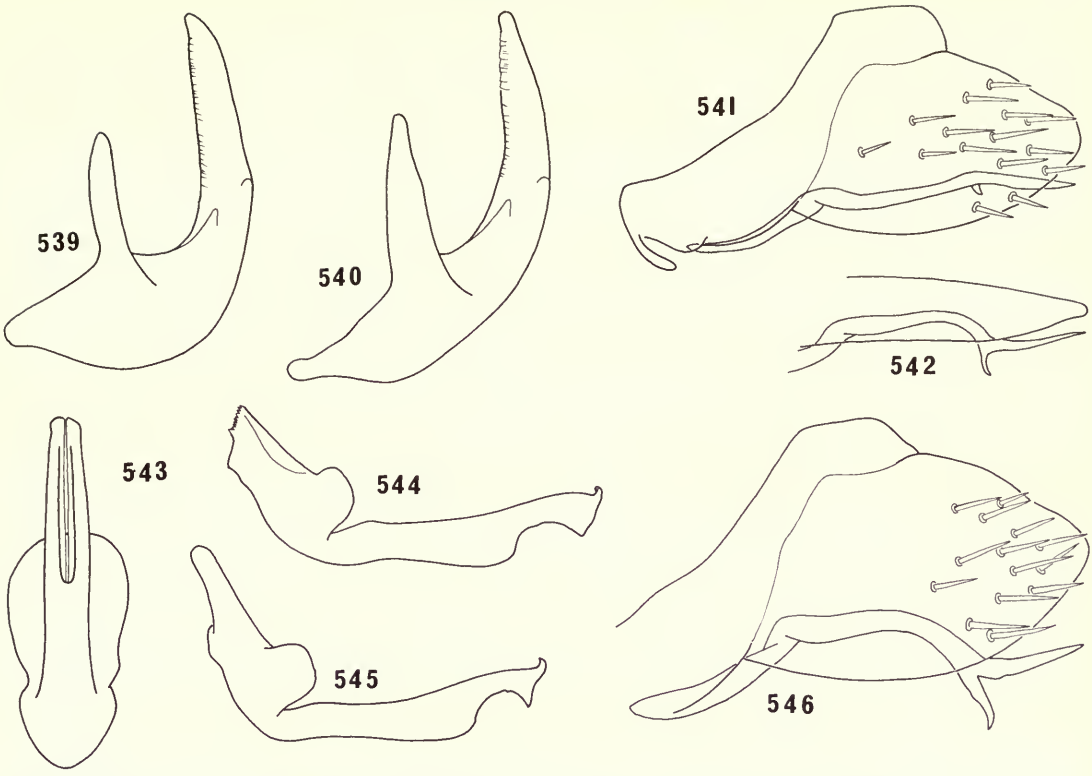
Batracomorphus eryx sp. n.

(Figs 539–546)

Length: ♂, 4·32–4·80 mm (mean 4·56 mm).

Vertex, pronotum, scutellum and forewings speckled with small variably sized dark brown spots.

Male genitalia. Pygophore processes elongate, directed posteriorly over basal half then curving ventroposteriorly or mesoposteriorly and finally posteriorly over distal third, apex acute, a short spur-like



Figs 539–546 *Batracomorphus eryx*. 539, 540, aedeagus; 541, pygophore (Waigeu Island, New Guinea); 542, same, ventral view; 543, aedeagus; 544, style (Finisterre Mts, New Guinea); 545, same (Waigeu Island); 546, pygophore (Finisterre Mts). (For further explanation see 'Techniques and methods'.)

process approximately one-third distance from apex on ventral or mesal margin. Styles with apical process expanded at midlength then abruptly narrowed to apex; apex acute, turned dorsomesally, hook-like; a triangular expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.

Remarks. The single specimen from the Finisterre Mountains has the pygophore processes slightly more robust, expecially the ventral spur, and the subapical expansion on the style slightly larger. It also differs in having the aedeagus less robust basally and may be a distinct species or subspecies.

The present species is similar to *laertes* from New Guinea and New Britain but is much smaller and with the dorsal spots extending over a wider area and variable in size. It also differs in having the apical third of the pygophore processes more slender and without serrations and the aedeagus without basal indentation on the posterior margin.

Material examined

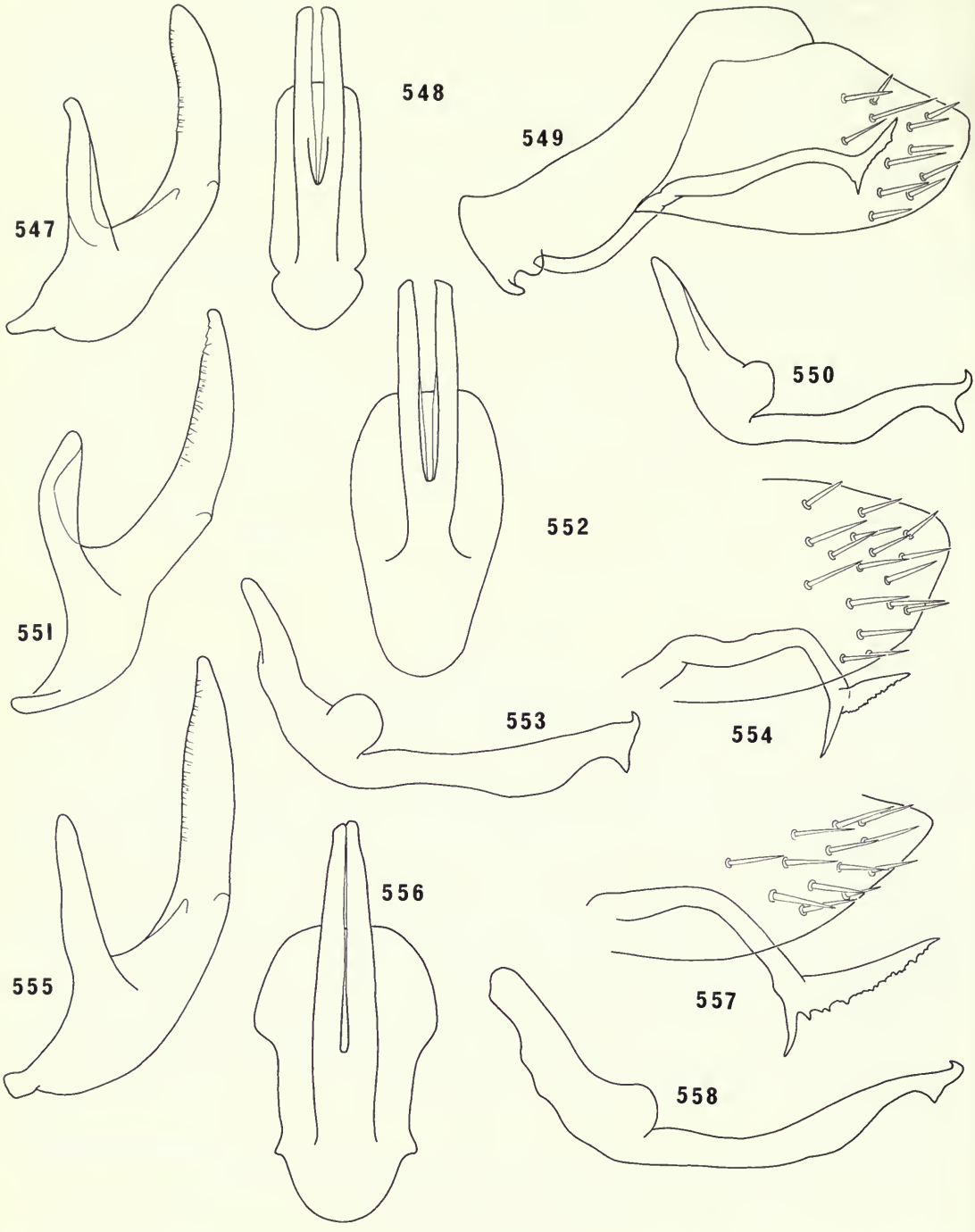
Holotype ♂, **New Guinea**: Irian Jaya, Waigeu, Camp Nok, 762 m, v.1938 (*L. E. Cheesman*) (BMNH).
Paratypes. **New Guinea**: 2 ♂, 3 ♀, Irian Jaya and Papua New Guinea (BMNH).

***Batracomorphus latinus* sp. n.**

(Figs 547–550)

Length: ♂, 5·12 mm.

Male genitalia. Pygophore processes slender, directed posteriorly, slightly sinuate, apex acute and turned dorsoposteriorly, a spur-like extension subapically on ventral margin with spur and ventral margin



Figs 547–558 547–550, *Batracomorphus latinus*. (547, 548) aedeagus; (549) pygophore; (550) style. 551–554, *B. laertes*. (551, 552) aedeagus; (553) style; (554) left pygophore lobe and process, left lateral view. 555–558, *B. portunus*. (555, 556) aedeagus; (557) left pygophore lobe and process, ventrolateral view; (558) style. (For further explanation see 'Techniques and methods'.)

distad to it sometimes keel-like and slightly serrate. Styles with apical process slightly expanded at midlength then tapering to short acute dorsally hooked apex, a finger-like projection subapically on ventral margin. Aedeagus simple; shaft directed dorsally; gonopore extending approximately two-thirds length of shaft; anterior incision slightly longer than gonopore.

REMARKS. This species is similar to *tyndareus* from Australia and *tarpeia* from New Britain but differs from both in being much larger and lacking dark brown spots on the forewings. It also differs from both in having the apex of the aedeagus broad rather than tapered, the pygophore processes more sinuate and in the shape of the subapical projection on the style.

MATERIAL EXAMINED

Holotype ♂, **New Britain**: Vunabakan, 180 m, 10 km E. of Keravat, 16–20.xi.1959 (*T. C. Maa*) (BPBM, Type No. 12,556).

Paratype. **New Britain**: 1 ♀, same data as holotype.

Batracomorphus laertes sp. n.

(Figs 551–554)

Length: ♂, 5·20–5·44 mm (mean 5·28 mm).

Forewings paler than body and faintly speckled with dark brown spots.

Male genitalia. Pygophore processes slender, directed posteriorly over basal half then turned posteromesally with distal fourth turned posteriorly, apex acute, a long ventrally directed spur-like projection on ventral margin approximately one-fourth length from apex, the ventral margin distad of spur serrate. Styles with apical process expanded immediately distad of midlength, tapering to short acute dorsally hooked apex, a triangular expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally, tapering to apex distally, posterior margin broadly concave near base in lateral aspect; gonopore and anterior incision approximately equal in length, extending approximately two-thirds length of shaft.

REMARKS. This species is closely related to *portunus* from New Guinea, but differs in having a more robust style, the ventral spur-like projection on the pygophore process relatively longer and the posterior margin of the aedeagus concave basally. The two species occur together in the same locality in New Guinea and are indistinguishable externally.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

Paratypes. **New Guinea**: 5 ♂, 1 ♀, Papua New Guinea (BMNH). **New Britain**: 2 ♂ (BPBM).

Batracomorphus portunus sp. n.

(Figs 555–558)

Length: ♂, 4·64–6·08 mm (mean 5·26 mm).

Forewings faintly mottled with brown.

Male genitalia. Pygophore processes slender, directed posteriorly over basal third then turned posteromesally with distal third turned posteriorly, apex acute, a ventrally directed spur-like projection on ventral margin approximately one-third distance from apex, ventral margin distad of spur serrate. Styles with apical process slender, elongate, slightly expanded immediately distad of midlength then tapering to short acute dorsally hooked apex, a triangular expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally, tapering to apex distally; gonopore and anterior incision of approximately equal length, extending approximately two-thirds length of shaft.

REMARKS. This species, known from only one locality, shows marked variability in size. It is closely related to *laertes*, which is sympatric in New Guinea and occurs also in New Britain, but differs in having the apical serrated portion of the pygophore process much longer, the apical process of the style more elongate and the posterior margin of the aedeagus smoothly rounded basally. The two species are indistinguishable externally.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

Paratypes. **New Guinea**: 4 ♂, same data as holotype (BMNH).

Batracomorphus capaneus sp. n.

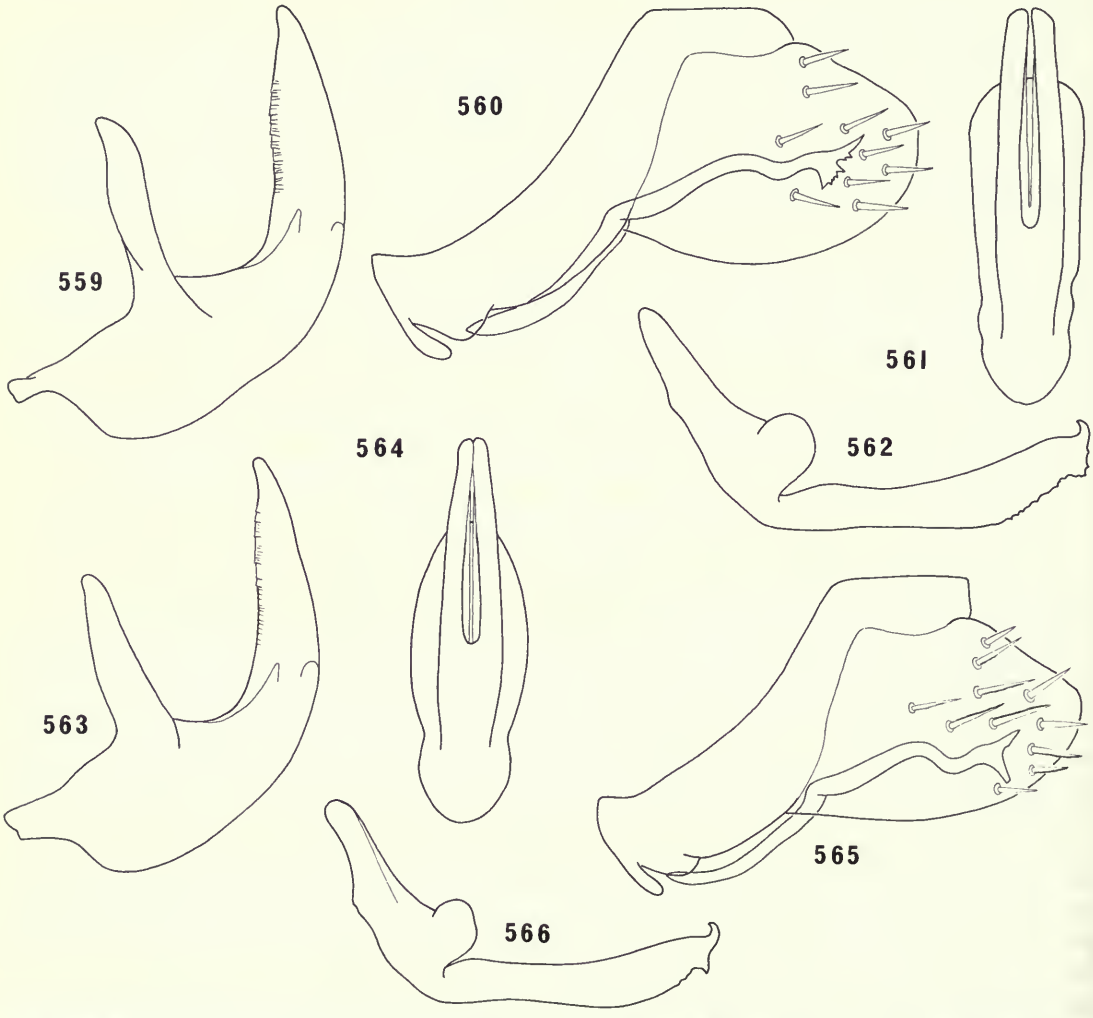
(Figs 559–562)

Length: ♂, 4·32 mm.

Forewings speckled with small dark brown tubercles.

Male genitalia. Pygophore processes slender, directed dorsoposteriorly and slightly sinuate immediately distad of midlength, apex expanded fan-like with posterior margin strongly serrate. Styles with apical process expanded over distal half and tapering to short acute dorsally hooked apex, a small triangular expansion subapically on ventral margin, ventral margin slightly serrate over distal third. Aedeagus simple; shaft directed dorsally, tapering to apex in lateral aspect; gonopore and anterior incision of approximately equal length, extending approximately two-thirds length of shaft.

Remarks. This species is similar to *laertes* from New Guinea and New Britain in the general shape of the male genitalia but differs in having a more robust aedeagus, the ventral margin of the style serrate distally and the apical portion of the pygophore process and subapical spur relatively smaller and linked together by a strongly serrate expansion. It is also smaller than *laertes*.



Figs 559–566 559–562, *Batracomorphus capaneus*. (559) aedeagus; (560) pygophore; (561) aedeagus; (562) style. 563–566, *B. palamedes*. (563, 564) aedeagus; (565) pygophore; (566) style. For further explanation see 'Techniques and methods'.)

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, Tawau, Quoin Hill, jungle, 3–7.vii.1962 (*H. Holtmann*) (BPBM, Type No. 12,557).

Batracomorphus palamedes sp. n.

(Figs 563–566)

Length: ♂, 3·92 mm.

Forewings speckled with small dark brown tubercles.

Male genitalia. Pygophore processes slender, directed dorsoposteriorly and slightly sinuate immediately distad of midlength, apex bifid with branches relatively short and of approximately equal length, the upper one acute and directed dorsoposteriorly and the lower one truncate and directed ventroposteriorly. Styles with apical process expanded over distal half and tapering to short acute dorsally hooked apex, a small triangular expansion subapically on ventral margin, the ventral margin immediately basad of subapical expansion slightly serrate. Aedeagus simple; shaft directed dorsally, tapering to apex in lateral aspect; gonopore and anterior incision of approximately equal length, extending approximately two-thirds length of shaft.

REMARKS. This species is very similar to *capaneus* from the same locality, and differs only in the apex of the pygophore process, the slightly more slender aedeagus and the more restricted serrations at the apex of the style. More material of each of these species may show them to be the same.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, Tawau, Quoin Hill, Cocoa Research Station, 22.viii.1962 (*Y. Hirashima*) (BPBM, Type No. 12,558).

Batracomorphus rhea sp. n.

(Figs 567–571)

Length: ♂, 4·88 mm.

Forewings paler than body; pronotum, scutellum and forewings speckled with small dark brown spots.

Male genitalia. Pygophore processes slender, directed posteriorly at base with medial third bending posteromesally, apical third turned abruptly dorsally and acutely ridged and weakly serrate on posterior margin. Styles with apical process slightly expanded at midlength then tapering to short acute dorsally hooked apex, a large triangular expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally and curving slightly anterodorsally, tapering to apex distally; gonopore extending to near base of shaft; anterior incision slightly longer than gonopore.

REMARKS. This species is similar to *daunus* from New Guinea but differs in having the pygophore processes turned posteromesally at their midlength and the aedeagus slightly more robust. It may also be distinguished by the presence of dark brown spots on the pronotum, scutellum and forewings.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Irian Jaya, Cyclops Mts, Sabron, 610 m, vi.1936 (*L. E. Cheesman*) (BMNH).

Paratypes. **New Guinea**: 2 ♀, same data as holotype.

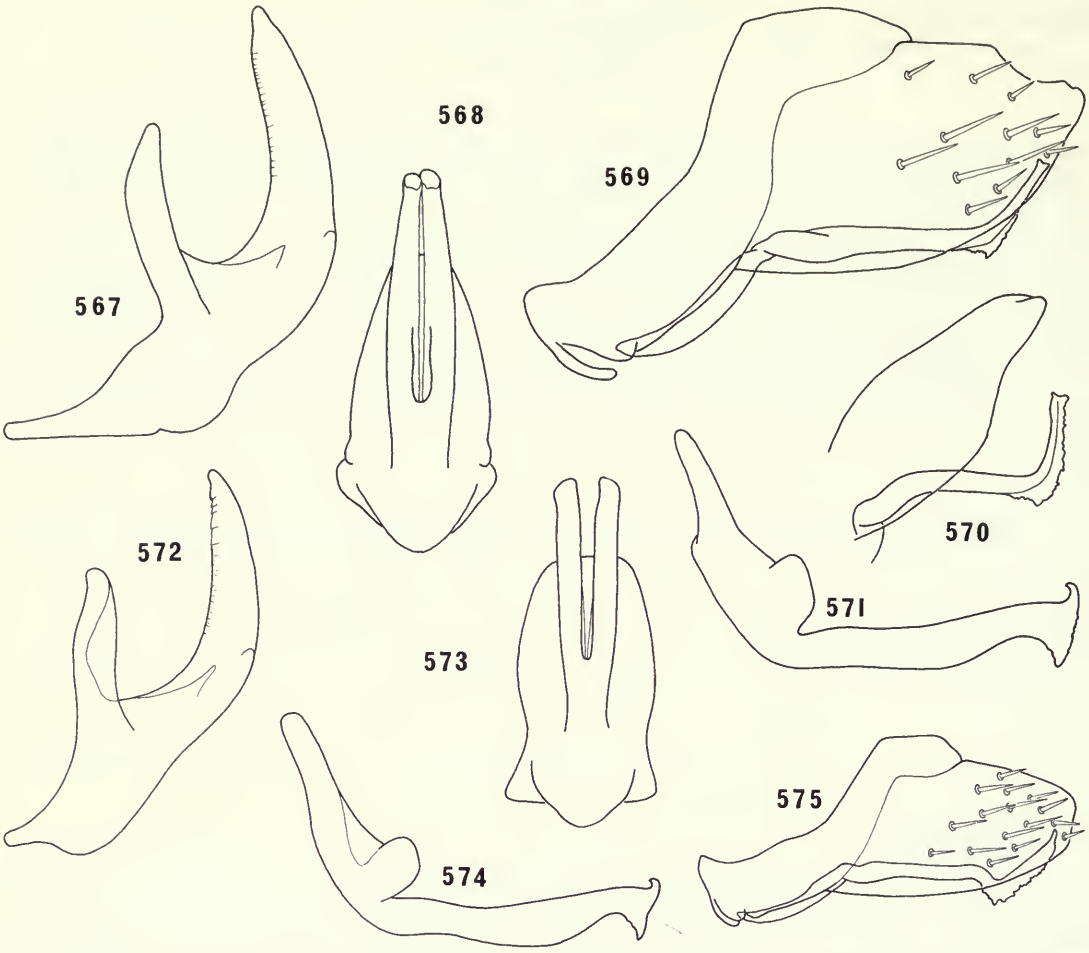
Batracomorphus daunus sp. n.

(Figs 572–575)

Length: ♂, 4·96 mm.

Male genitalia. Pygophore processes slender, directed posteriorly, apical third turned abruptly dorsoposteriorly with posterior margin acutely ridged and mildly serrate, apex acute. Styles with apical process expanded at midlength then tapering to short acute dorsally hooked apex, a triangular expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally, tapering to apex in lateral aspect; gonopore extending to just basad of midlength of shaft; anterior incision extending to near base of shaft.

REMARKS. This species is closely related to *rhea* from New Guinea but lacks dark brown spots on



Figs 567–575 567–571, *Batracomorphus rhea*. (567, 568) aedeagus; (569) pygophore; (570) left pygophore lobe and process, posterolateroventral view; (571) style. 572–575, *B. daunus*. (572, 573) aedeagus; (574) style; (575) pygophore. (For further explanation see 'Techniques and methods'.)

the pronotum, scutellum and forewings, has a more slender aedeagus and the pygophore processes straight rather than curved over their midlength.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Mafulu, 1220 m, xii.1933 (*L. E. Cheesman*) (BMNH).

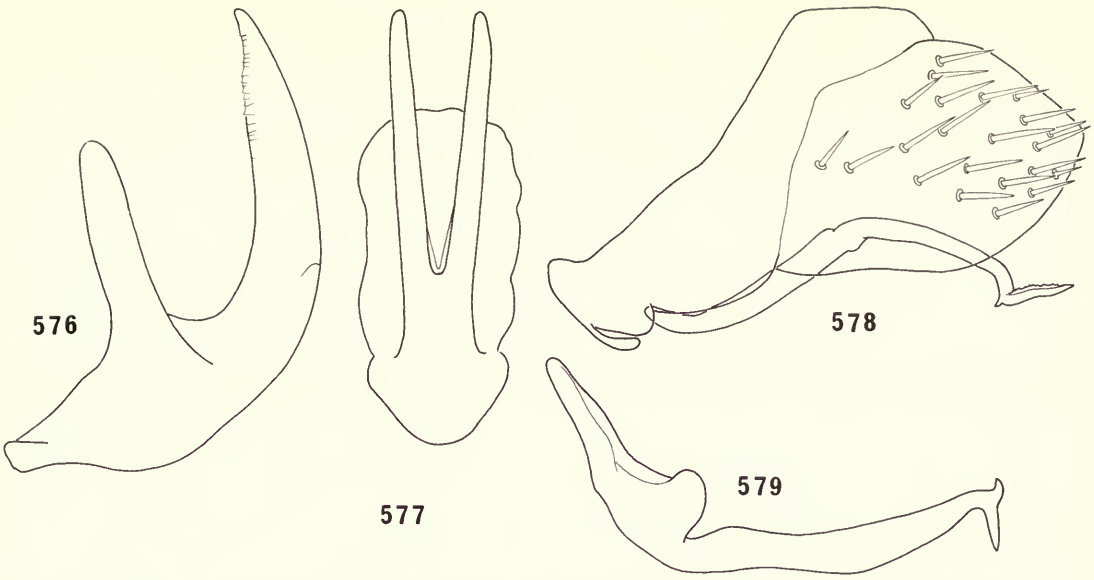
Batracomorphus jove sp. n.

(Figs 576–579)

Length: ♂, 4·80 mm.

Vertex with dark brown spot on each side midway between midline and eye; pronotum and scutellum speckled with small dark brown spots; forewings irregularly mottled and marked with dark brown, apical cells and two transverse bands, one at midlength of clavus and another at apex of clavus, unpigmented.

Male genitalia. Pygophore processes slender, directed posteriorly with distal portion turned abruptly ventrally and then immediately posteriorly, apex acute, posteriorly directed apical portion acuminate and slightly serrate dorsally with a small spur-like projection ventrally at its base. Styles with apical process slender, slightly expanded near midlength then tapered to short acute dorsally hooked apex, a relatively long thorn-like projection subapically on ventral margin. Aedeagus simple; shaft directed dorsally,



Figs 576–579 *Batracomorphus jove*. 576, 577, aedeagus; 578, pygophore; 579, style. (For further explanation see 'Techniques and methods'.)

tapering to apex over distal half in lateral aspect; gonopore and anterior incision of approximately equal length, extending approximately two-thirds length of shaft.

REMARKS. This species is similar to *tyndareus* from Australia but differs not only in external markings but also in the orientation of the apical portion of the pygophore process, the serration on the dorsal margin of the latter and the relatively smaller subapical spur.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

Batracomorphus numa sp. n.

(Figs 580–584)

Length: ♂, 5·04–5·12 mm (mean 5·08 mm).

Forewings speckled with small dark brown spots.

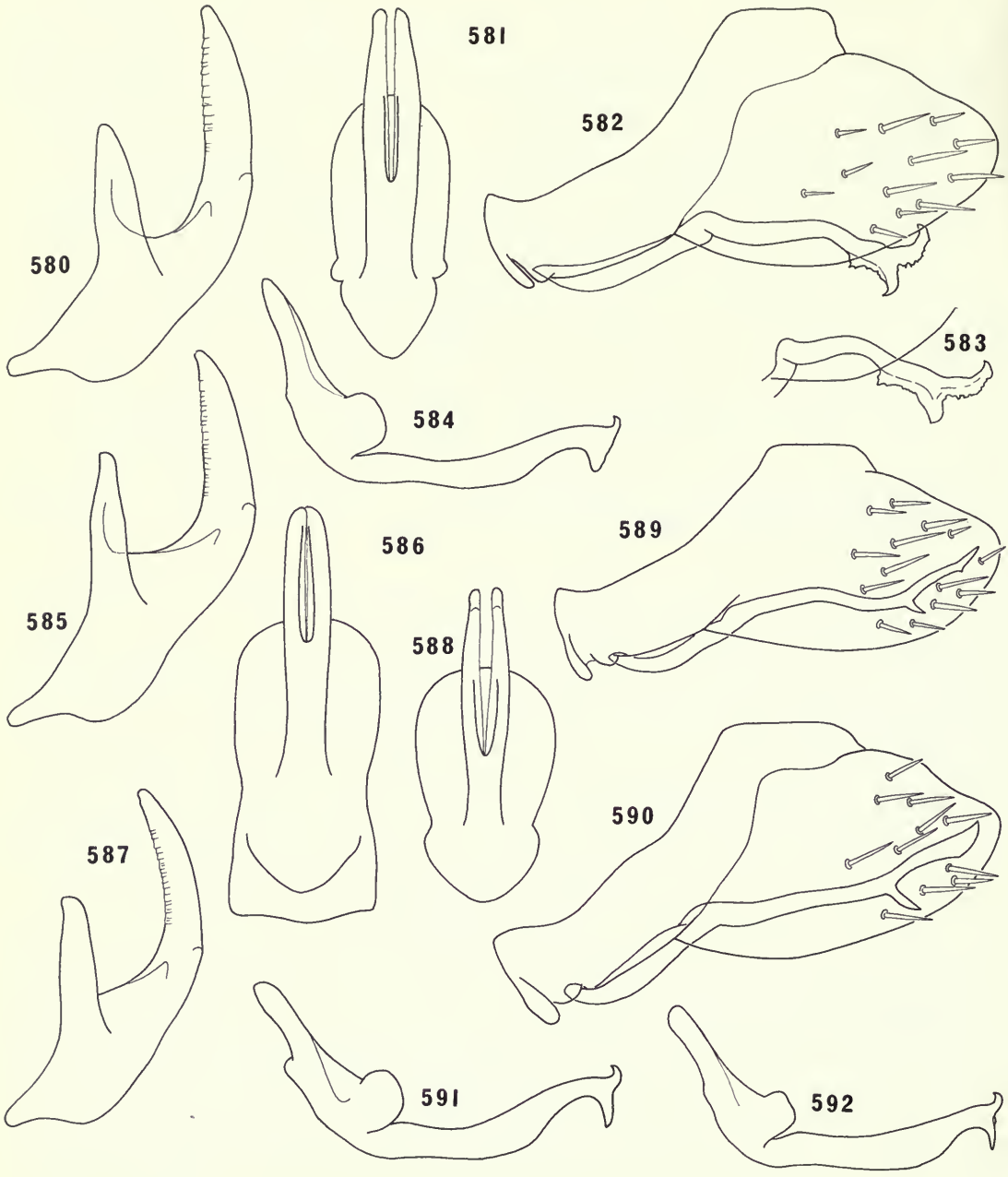
Male genitalia. Pygophore processes slender, directed posteriorly over basal half, distal half turned posteromesally, apex acute and upturned, a spur-like projection subapically on ventral margin, ventral margin over distal half acutely ridged and expanded into irregularly serrated crest. Styles with apical process slender, slightly expanded at midlength and tapering to short acute dorsally hooked apex, a triangular expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally, tapering to apex distally in lateral aspect; gonopore extending approximately two-thirds length of shaft; anterior incision extending approximately three-fourths length of shaft.

REMARKS. This species is similar to *tarpeia* from New Britain but is much larger. The pygophore processes are also more robust apically with a strong ventral keel over their distal half and the subapical expansion on the style is relatively larger.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Moro, 1692 m, 30.x–15.xi.1964 (*M. E. Bacchus*) (BMNH).

Paratypes. **New Guinea**: 2 ♂, 1 ♀, same data as holotype.



Figs 580–592 580–584, *Batracomorphus numa*. (580, 581) aedeagus; (582) pygophore; (583) left pygophore process, posterolateral view; (584) style. 585–592, *B. virbius*. (585, 586) aedeagus (Cyclops Mts, New Guinea); (587, 588) aedeagus (Waigeu Island, New Guinea); (589) pygophore (Waigeu Island); (590) pygophore (Cyclops Mts); (591) style (Cyclops Mts); (592) style (Waigeu Island). (For further explanation see 'Techniques and methods'.)

Batracomorphus virbius sp. n.

(Figs 585–592)

Length: ♂, 4·24–5·36 mm (mean 4·70 mm).

Forewings speckled with small irregular dark brown spots, sometimes very faint, rarely also on pronotum and scutellum.

Male genitalia. Pygophore processes slender, slightly sinuate, directed posteriorly with distal third turned slightly more dorsad, expanded subapically or with small dentate projection subapically on ventral margin, apex acute, a short spur-like process on ventral margin approximately one-third distance from apex. Styles with apical process slender, expanding slightly to midlength then tapering to short acute dorsally hooked apex, an acute finger-like projection subapically on ventral margin. Aedeagus simple; shaft directed dorsally, curving slightly anterodorsally towards apex, tapering to apex in lateral aspect; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.

Remarks. This species, which extends from the Moluccas to the eastern extremity of New Guinea, varies slightly in the apical expansion of the pygophore processes. The broadly expanded blade-like apex occurs in specimens from the Humboldt Bay and Cyclops Mountains areas of New Guinea whilst those with the more slender apex with only a small dentate projection occur in Ambon Island, Waigeu Island and the Milne Bay area of New Guinea. The Ambon Island specimen also has the large ventral spur on the pygophore process spatulate and truncate. There is also slight variation in both size and pigmentation, two of the Cyclops Mountains specimens being markedly larger than normal and with the dark brown spots occurring also on the pronotum and scutellum.

The species is similar to *latinus* from New Britain but differs in having the pygophore processes more or less expanded apically, with the spur-like process on its ventral margin directed posteriorly rather than ventrally and without serrations. The present species also has the subapical process on the style more slender and the forewings speckled with dark brown spots.

Material examined

Holotype ♂, **New Guinea**: Irian Jaya, Cyclops Mts, Sabron, 610 m, vii.1936 (*L. E. Cheesman*) (BMNH).

Paratypes. **Ambon Island**: 1 ♂ (BPBM). **New Guinea**: 5 ♂, 5 ♀, Irian Jaya and Papua New Guinea (BMNH, USNM).

Batracomorphus nabirensis Evans

(Figs 593–596)

Batrachomorphus nabirensis Evans, 1972: 651. Holotype ♂, New Guinea (BPBM) [examined].

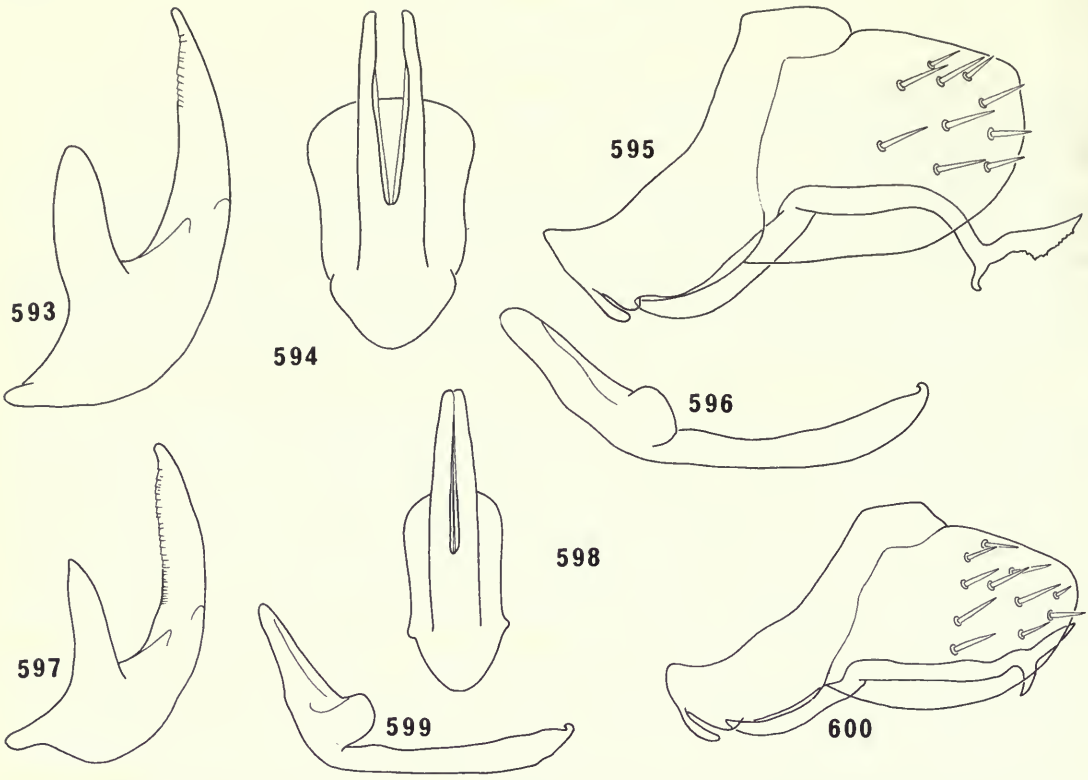
Length: ♂, 4·00 mm.

Vertex and face stramineous, pronotum and scutellum dark brown, forewings translucent, whitish or pale stramineous, apical margin and narrow transverse band at midlength dark brown.

Male genitalia. Pygophore processes slender, directed posteriorly over basal third, ventroposteriorly over mid third, then abruptly posteriorly over distal third, apex acute, a slender finger-like projection on ventral margin approximately one-third distance from apex, ventral margin expanded keel-like and mildly serrate subapically. Styles with apical process slender, slightly expanded over distal half and tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, turning slightly anterodorsally distally, tapering to apex in lateral aspect; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.

Remarks. This species resembles *virbius* from New Guinea in having the pygophore processes expanded subapically but differs in the orientation of the processes and in having the subapical expansion marginally serrate. It also differs in lacking a subapical projection on the style and in its coloration.

Distribution. New Guinea.



Figs 593–600 593–596, *Batracomorphus nabirensis* (holotype). (593, 594) aedeagus; (595) pygophore; (596) style. 597–600, *B. agenor*. (597, 598) aedeagus; (599) style; (600) pygophore. (For further explanation see 'Techniques and methods'.)

MATERIAL EXAMINED

Batrachomorphus nabirensis Evans, holotype ♂, **New Guinea**: Irian Jaya, Nabire, 5–50 m, jungle, 25.viii–2.ix.1962 (*H. Holtmann*) (BPBM).

New Guinea: 1 ♀, Papua New Guinea (BPBM).

Batracomorphus agenor sp. n.

(Figs 597–600)

Length: ♂, 3·76–4·00 mm (mean 3·92 mm).

Disc of pronotum, one large and two small spots on each anterolateral margin of pronotum, and apex and basal angles of scutellum, dark brown; forewings whitish stramineous or greyish; females with pronotum and scutellum more uniformly dark brown and with a narrow transverse dark brown band at midlength of forewings.

Male genitalia. Pygophore processes slender, directed posteriorly, apex acute and turned dorsoposteriorly, a spur-like projection subapically on ventral margin. Styles with apical process slender, slightly expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, tapering to apex distally in lateral aspect; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. This species resembles *tarpeia* from New Britain in the shape of its pygophore processes but has the latter directed posteriorly throughout their length rather than turned mesally from their midlength. It also lacks a subapical expansion on the style and differs in coloration.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

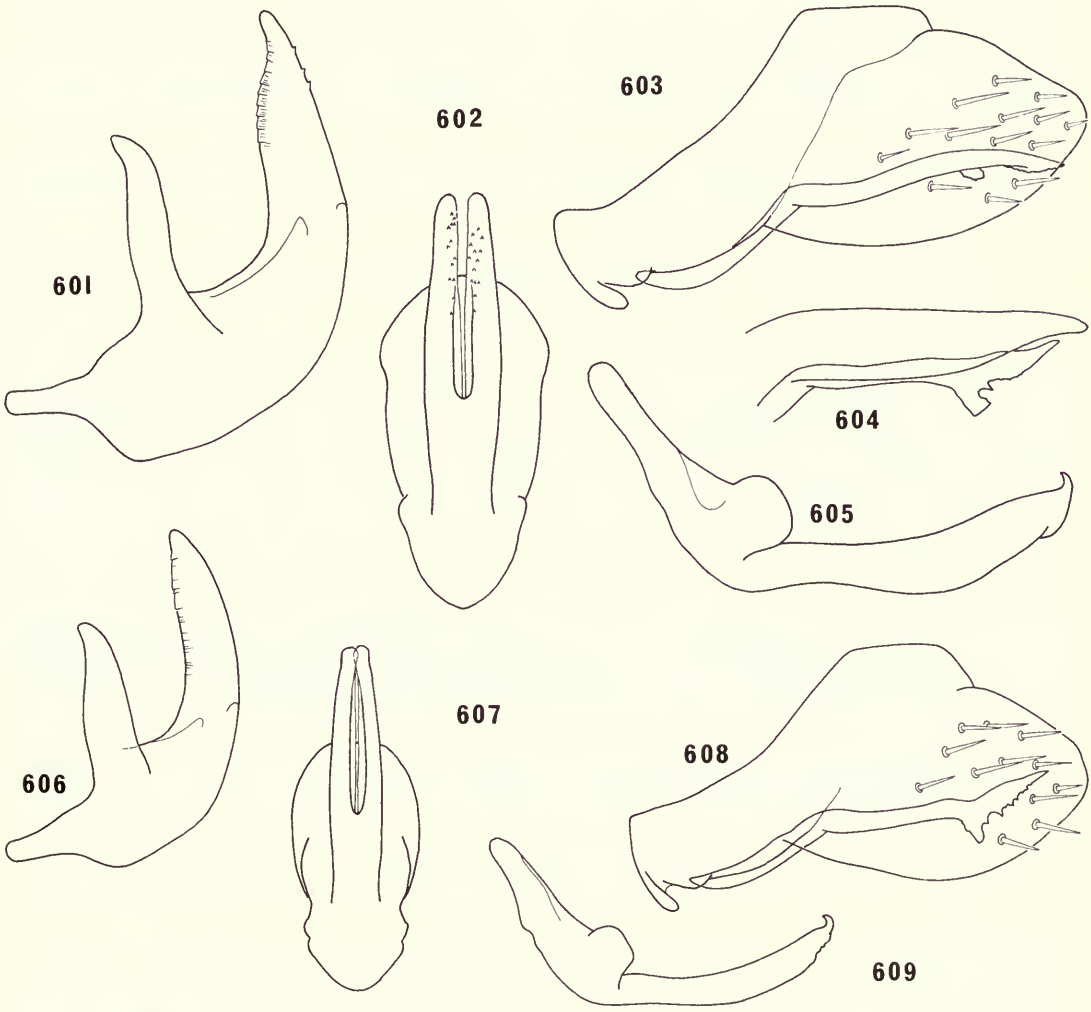
Paratypes. **New Guinea**: 7 ♂, 7 ♀, Papua New Guinea (BMNH).

Batracomorphus musaeus sp. n.

(Figs 601–605)

Length: ♂, 5·44 mm.

Male genitalia. Pygophore processes elongate, directed posteriorly, apex acute, a short medially directed truncate projection on medial margin approximately one-third distance from apex, medial margin of process distad of projection lamellate and slightly serrate. Styles with apical process slightly expanded over distal half, tapering to short acute dorsally hooked apex, a small convex lamellate expansion subapically on ventral margin. Aedeagus simple, robust; shaft directed dorsally, abruptly tapered subapically in lateral aspect, posterior margin with small tubercles distally; gonopore and anterior incision of approximately equal length, extending to just basad of midlength of shaft.



Figs 601–609 601–605, *Batracomorphus musaeus*. (601, 602) aedeagus; (603) pygophore; (604) left pygophore lobe and process, ventral view; (605) style. 606–609, *B. ceres*. (606, 607) aedeagus; (608) pygophore; (609) style. (For further explanation see 'Techniques and methods'.)

REMARKS. This species is similar to *ceres* from New Guinea but differs in the orientation of the pygophore processes, a more expanded style and a more robust aedeagus the shaft of which is more abruptly tapered apically. It also differs markedly in size.

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Luzon, Ifugao Province, Liwo, 8 km E. of Mayoyao, 1000–1300 m, 12.vi.1967 (*H. M. Torrevillas*) (BPBM, Type No. 12,559).

Batracomorphus ceres sp. n.

(Figs 606–609)

Length: ♂, 4·08–4·16 mm (mean 4·10 mm).

Male genitalia. Pygophore processes elongate, directed posteriorly with apical third turned slightly dorsally, apex acute, a short projection on ventral margin at base of upturned section with ventral margin between it and apex acuminate and serrate. Styles with apical process slender, of uniform width throughout length or only slightly expanded over distal half, terminating in short acute dorsally hooked apex, ventral margin mildly serrate subapically. Aedeagus simple; shaft directed dorsally, curving slightly anterodorsally over distal half; gonopore extending approximately three-fourths length of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. This species is similar to *musaeus* from the Philippines but differs in the orientation of the pygophore processes, a more slender style and aedeagus and is much smaller. It is known only from north-east Irian Jaya.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Irian Jaya, Cyclops Mts, Sabron, 610 m, vii.1936 (*L. E. Cheesman*) (BMNH).

Paratypes. **New Guinea**: 2 ♂, Irian Jaya (BMNH).

Batracomorphus hera sp. n.

(Figs 610–615)

Length: ♂, 5·12–5·28 mm (mean 5·20 mm).

Male genitalia. Pygophore processes slender, directed posteriorly with distal half directed dorsoposteriorly to greater or lesser degree, strongly arched in ventral aspect with apex directed posteromesally, apex acute, a subapical spur-like projection on lateral margin, lateral margin between spur and apex acuminate and expanded to variable degree. Style with apical process expanded over distal half, tapering to short acute dorsally hooked apex, ventral margin acuminate and slightly serrate subapically. Aedeagus simple; shaft directed dorsally, curving anterodorsally over distal half, tapering to apex in lateral aspect; gonopore extending approximately three-fourths length of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. This species is similar to *musaeus* from the Philippines but differs in having the pygophore processes strongly arched with the subapical spur closer to the apex and on the lateral rather than the mesal margin, the aedeagus more slender and without posterior tubercles and the subapical expansion on the style serrate rather than smoothly rounded.

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Mindanao, Misamis Or., Mt Pomalihi, 21 km W. of Gingoog City, 800–1000 m, 9.x.1965 (*H. M. Torrevillas*) (BPBM, Type No. 12,560).

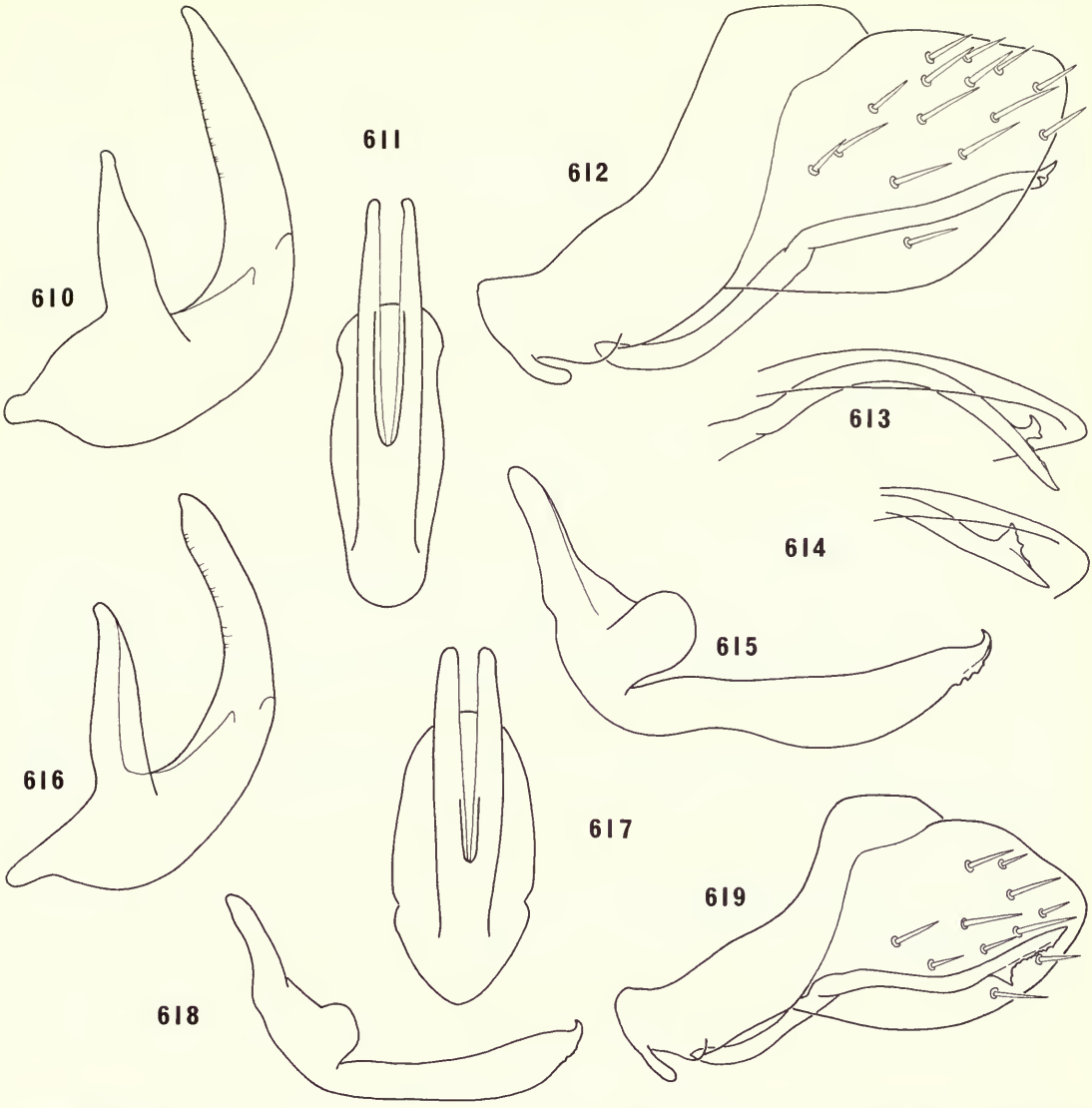
Paratype. **Philippines**: 1 ♂, same data as holotype except 16.x.1965 (BPBM).

Batracomorphus dardanus sp. n.

(Figs 616–619)

Length: ♂, 4·16 mm.

Male genitalia. Pygophore processes slender, directed posteriorly with apical half turned dorsoposteriorly, apex acute, ventral margin keeled and serrate along apical third. Styles with apical process expanded over distal half, tapered to short acute dorsally hooked apex. Aedeagus simple; shaft slender, directed dorsally and curving anterodorsally over distal half; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.



Figs 610–619 610–615, *Batracomorphus hera*. (610, 611) aedeagus; (612) pygophore; (613) left pygophore lobe and process, ventral view; (614) same; (615) style. 616–619, *B. dardanus*. (616, 617) aedeagus; (618) style; (619) pygophore. (For further explanation see 'Techniques and methods'.)

REMARKS. This species is similar to *ceres* from New Guinea but has the aedeagus more slender, the style more robust and the pygophore processes turned more abruptly dorsad.

MATERIAL EXAMINED

Holotype ♂, **New Britain**: Gazelle Peninsula, Mt Sinewit, 900 m, 13.xi.1962 (*J. Sedlacek*) (BPBM, Type No. 12,561).

Batracomorphus aeneas sp. n.

(Figs 620–624)

Length: ♂, 4·16 mm.

Male genitalia. Pygophore processes slender, directed posteriorly, curving posteromesally immediately distad of midlength then abruptly laterally, apex acute, an acute posteriorly directed spur-like projection

on mesal margin at base of distal laterally directed section. Styles with apical process slender, slightly expanded over distal half, abruptly narrowed subapically to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, tapering to apex in lateral aspect; gonopore and anterior incision extending to just basad of midlength of shaft.

REMARKS. This species is similar to *orion* from the Philippines but differs in having a relatively shorter gonopore and anterior incision, a more slender style and the pygophore processes straight rather than arched in lateral aspect. It also resembles *tatius* from the Bismark Archipelago but lacks dark brown spots on the forewings and a subapical expansion on the style.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

Batracomorphus orion sp. n.

(Figs 625–629)

Length: ♂, 4·40–4·64 mm (mean 4·49 mm).

Male genitalia. Pygophore processes slender, directed posteriorly and slightly arched over distal half in lateral aspect, curving posteromesally at midlength then abruptly laterally, apex acute, an acute posteriorly directed spur-like projection on mesal margin at base of laterally directed apical section. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally and curving slightly anterodorsally, tapering to apex distally in lateral aspect; gonopore extending approximately three-fourths length of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. This species is similar to *aeneas* from New Guinea but differs in having a relatively longer gonopore and anterior incision, a more robust style and the pygophore processes slightly arched in lateral aspect.

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Luzon, Ifugao Province, Liwo, 8 km E. of Mayoyao, 1000–1300 m, 2–6.vi.1967 (*H. M. Torrevillas*) (BPBM, Type No. 12,562).

Paratypes. **Philippines**: 5 ♂, 2 ♀, Luzon and Negros (BPBM).

Batracomorphus tatius sp. n.

(Figs 630–634)

Length: ♂, 4·64–5·04 mm (mean 4·88 mm).

Forewings sparsely speckled with small variably sized dark brown spots.

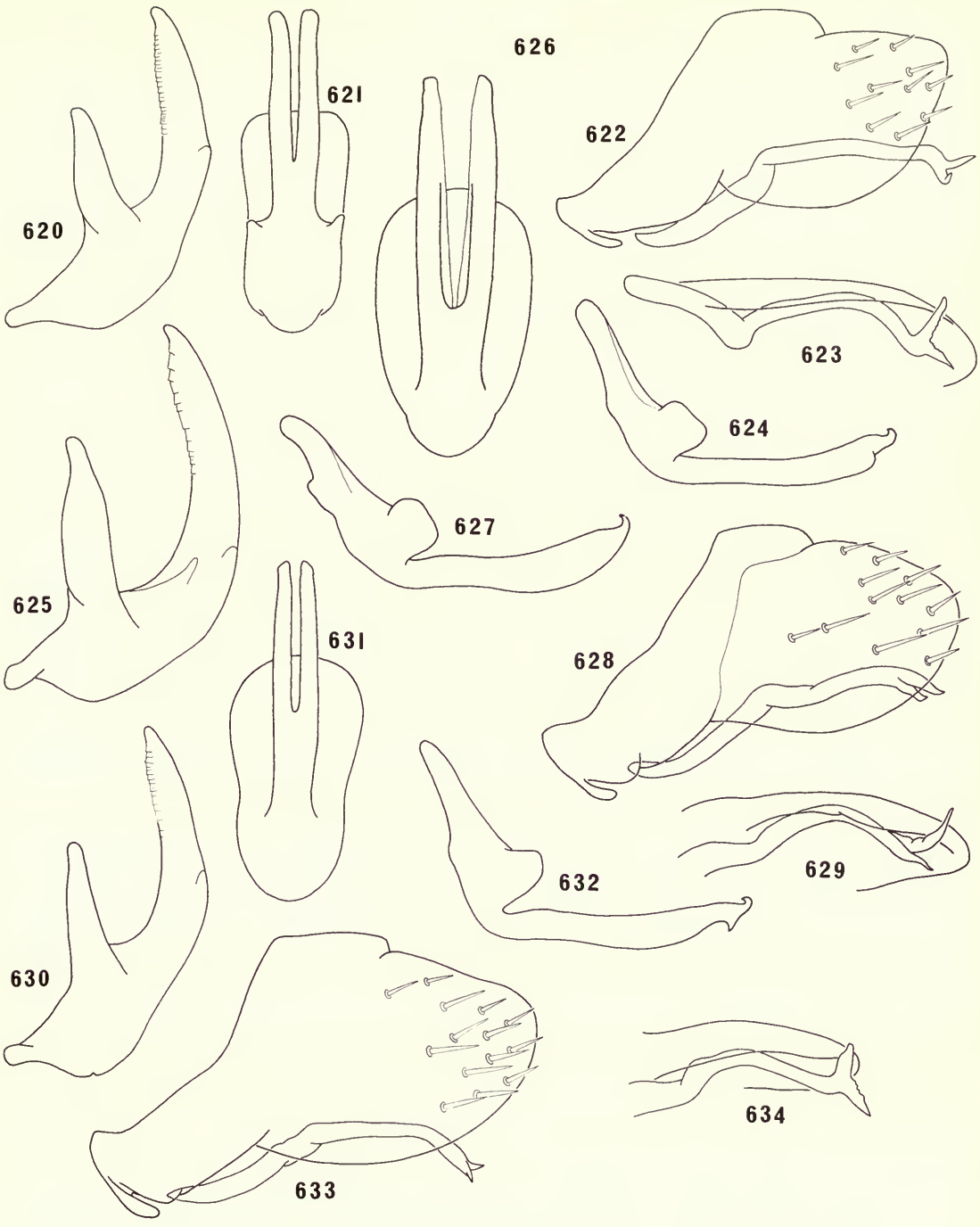
Male genitalia. Pygophore processes slender, directed posteriorly with distal third turned posteroventrally, curving posteromesally at midlength and abruptly laterally near apex, an acute posteromesally directed spur-like projection on mesal margin near base of laterally directed section. Styles with apical process slender, slightly expanded immediately distad of midlength and tapering to short acute dorsally hooked apex; a small triangular expansion subapically on ventral margin. Aedeagus simple; shaft directed dorsally and turned slightly anterodorsally at midlength, tapering to apex distally in lateral aspect; gonopore and anterior incision extending to approximately midlength of shaft.

REMARKS. This species is similar to *aeneas* from New Guinea but has dark brown spots on the forewings, and the apical process of the style more gradually tapered and with a subapical expansion on the ventral margin.

MATERIAL EXAMINED

Holotype ♂, **New Ireland**: Lemkamin, 7.iv.1962 (ZM).

Paratypes. **New Britain**: 3 ♂, 1 ♀ (BPBM). **New Ireland**: 2 ♂ (BMNH, ZM).



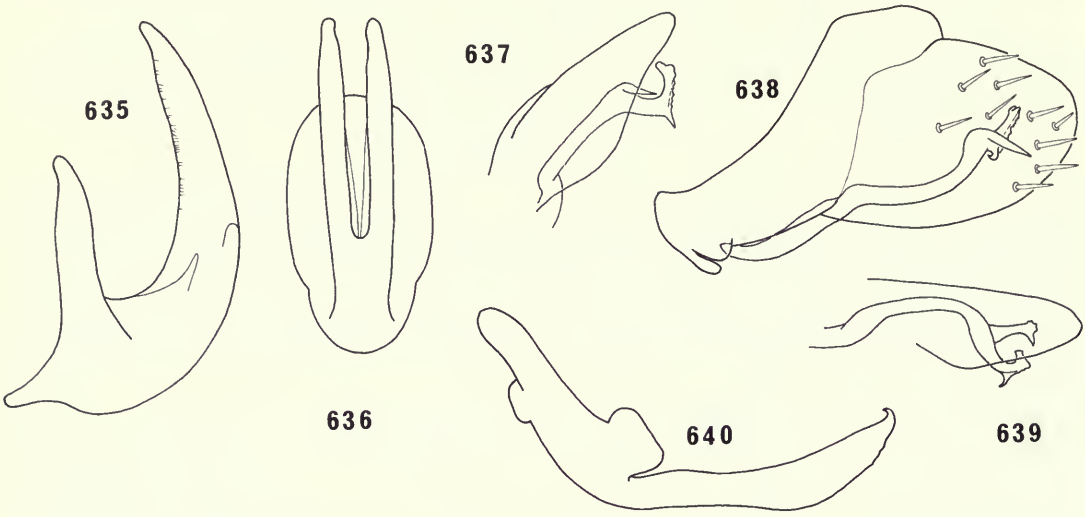
Figs 620–634 620–624, *Batracomorphus aeneas*. (620, 621) aedeagus; (622) pygophore; (623) left pygophore lobe and process, ventral view; (624) style. 625–629, *B. orion*. (625, 626) aedeagus; (627) style; (628) pygophore; (629) left pygophore lobe and process, ventral view. 630–634, *B. tatius*. (630, 631) aedeagus; (632) style; (633) pygophore; (634) left pygophore lobe and process, ventral view. (For further explanation see 'Techniques and methods'.)

Batracomorphus dido sp. n.

(Figs 635–640)

Length: ♂, 4·40 mm.

Male genitalia. Pygophore processes slender, directed posteriorly to midlength then turned dorsally and bifurcating into a short posteriorly directed spatulate branch, its apex slightly expanded and truncate, and a longer medially directed branch turned dorsad at its midlength and becoming spatulate, its apex slightly expanded and truncate, a short spur-like projection on ventral margin of medially directed branch at its midlength. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, curving anterodorsally from midlength, tapering to apex in lateral aspect; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.



Figs 635–640 *Batracomorphus dido*. 635, 636, aedeagus; 637, left pygophore lobe and process, posterolateral view; 638, pygophore; 639, left pygophore lobe and process, ventral view; 640, style. (For further explanation see 'Techniques and methods'.)

Remarks. This species is superficially similar to *itys* from Sumatra, West Malaysia and the Philippines in the shape of the pygophore processes but differs markedly in the shape of the aedeagus and style. It is perhaps most closely related to *orion* from the Philippines but differs in the orientation of the pygophore processes as well as the spatulate expansion of its apical branches.

Material examined

Holotype ♂, **Philippines**: Palawan, Mantalingajan, Pinigisan, 600 m, 10.ix.1961 (ZM).

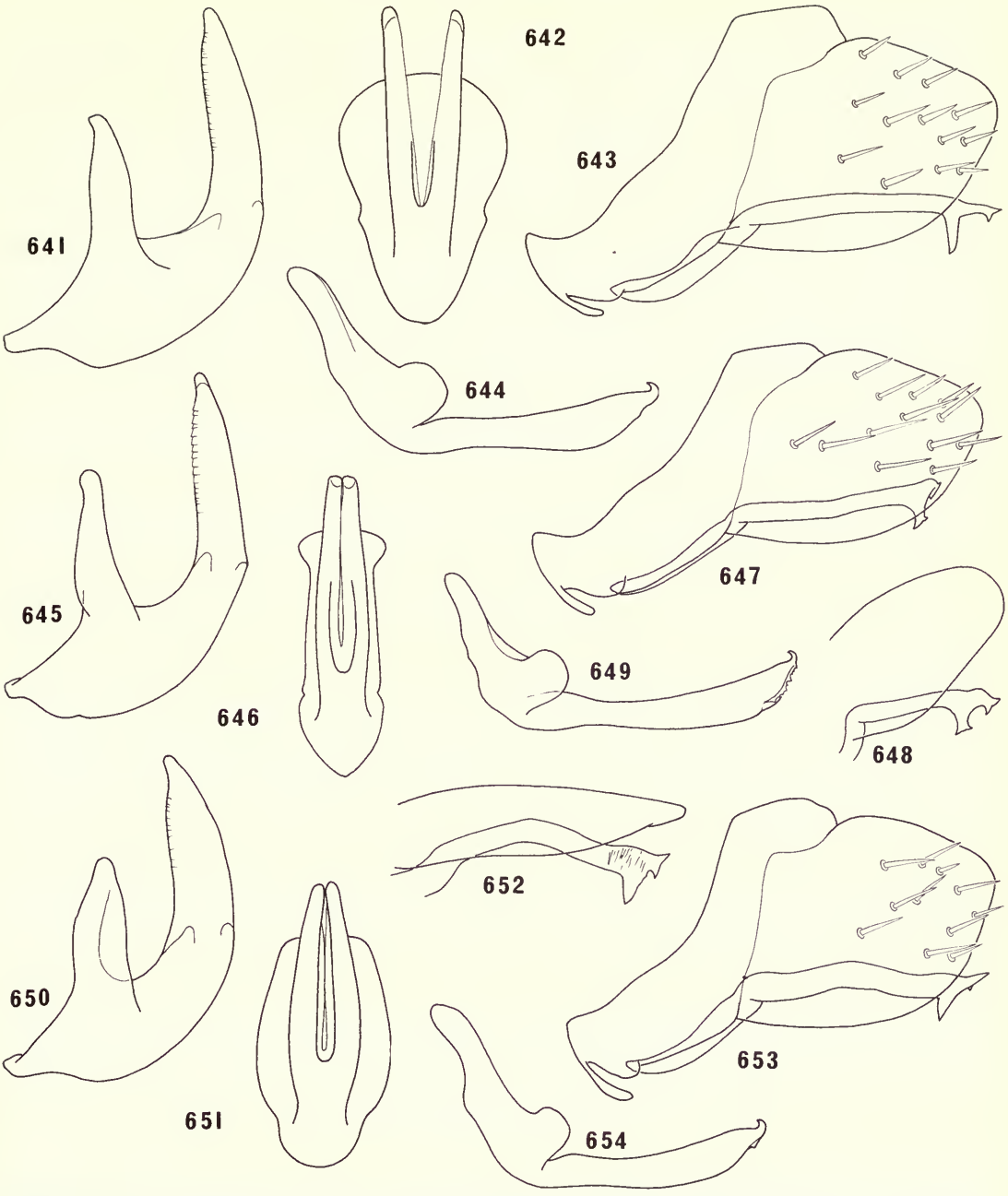
Batracomorphus molus sp. n.

(Figs 641–644)

Length: ♂, 4·24–4·40 mm (mean 4·32 mm).

Pronotum and anterior half of scutellum brown speckled with small dark brown spots; clypellus, lora, gena, apex of forewings, patch on claval commissure immediately distad of midlength and anterior end of appendix, dark brown.

Male genitalia. Pygophore processes slender, directed posteriorly, apex bifurcate with branches of equal length, lower branch acute and directed ventrally, upper branch weakly bifurcate and directed posteriorly. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, tapering to apex distally; gonopore extending approximately three-fourths length of shaft; anterior incision extending slightly more basad than gonopore.



Figs 641–654 641–644, *Batracomorphus molus*. (641, 642) aedeagus; (643) pygophore; (644) style. 645–649, *B. pyrrhus*. (645, 646) aedeagus; (647) pygophore; (648) left pygophore lobe and process, posterolateral view; (649) style. 650–654, *B. eriphyle*. (650, 651) aedeagus; (652) left pygophore lobe and process, ventrolateral view; (653) pygophore; (654) style. (For further explanation see 'Techniques and methods'.)

Remarks. This species is closely related to *pyrrhus* and *eriphyle* from New Guinea but differs from both in the relative length, shape and orientation of the apical branches of the pygophore processes, and in coloration.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

Paratype: **New Guinea**: 1 ♂, Irian Jaya (USNM).

Batracomorphus pyrrhus sp. n.

(Figs 645–649)

Length: ♂, 4·72 mm.

Male genitalia. Pygophore processes slender, directed posteriorly, apex bifurcate with branches short, weakly bifurcate and of approximately equal length, the upper one turned medially and the lower one ventrally. Styles with apical process expanded over distal half and tapering to short acute dorsally hooked apex; ventrolateral margin acutely ridged and weakly serrate subapically. Aedeagus simple; shaft directed dorsally, tapering to apex in lateral aspect; gonopore and anterior incision of approximately equal length, extending approximately three-fourths length of shaft.

REMARKS. This species is closely related to *molus* and *eriphyle* from New Guinea but differs from both species in the relative length and shape of the apical branches of the pygophore processes, the subapical serrations on the style and in coloration.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Mafulu, 1220 m, xii.1933 (*L. E. Cheesman*) (BMNH).

Batracomorphus eriphyle sp. n.

(Figs 650–654)

Length: ♂, 4·24 mm.

Forewings speckled with small dark brown spots.

Male genitalia. Pygophore processes robust, directed posteriorly, apex bifurcate with branches short, one robust acute and directed ventrally and the other much shorter, mildly bifurcate and directed posteriorly. Styles with apical process expanded over distal half and tapering to short acute dorsally hooked apex; a very small subapical projection sometimes present on ventral margin. Aedeagus simple; shaft directed dorsally, tapering to apex in lateral aspect; gonopore and anterior incision equal in length, extending approximately three-fourths length of shaft.

REMARKS. The subapical projection on the ventral margin of the style, illustrated for the left style of the holotype (Fig. 654), is absent on the right style. This species is closely related to *molus* and *pyrrhus* from New Guinea but differs from both in having a more robust aedeagus and pygophore processes and in coloration.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Moro, 1692 m, 30.x–15.xi.1964 (*M. E. Bacchus*) (BMNH).

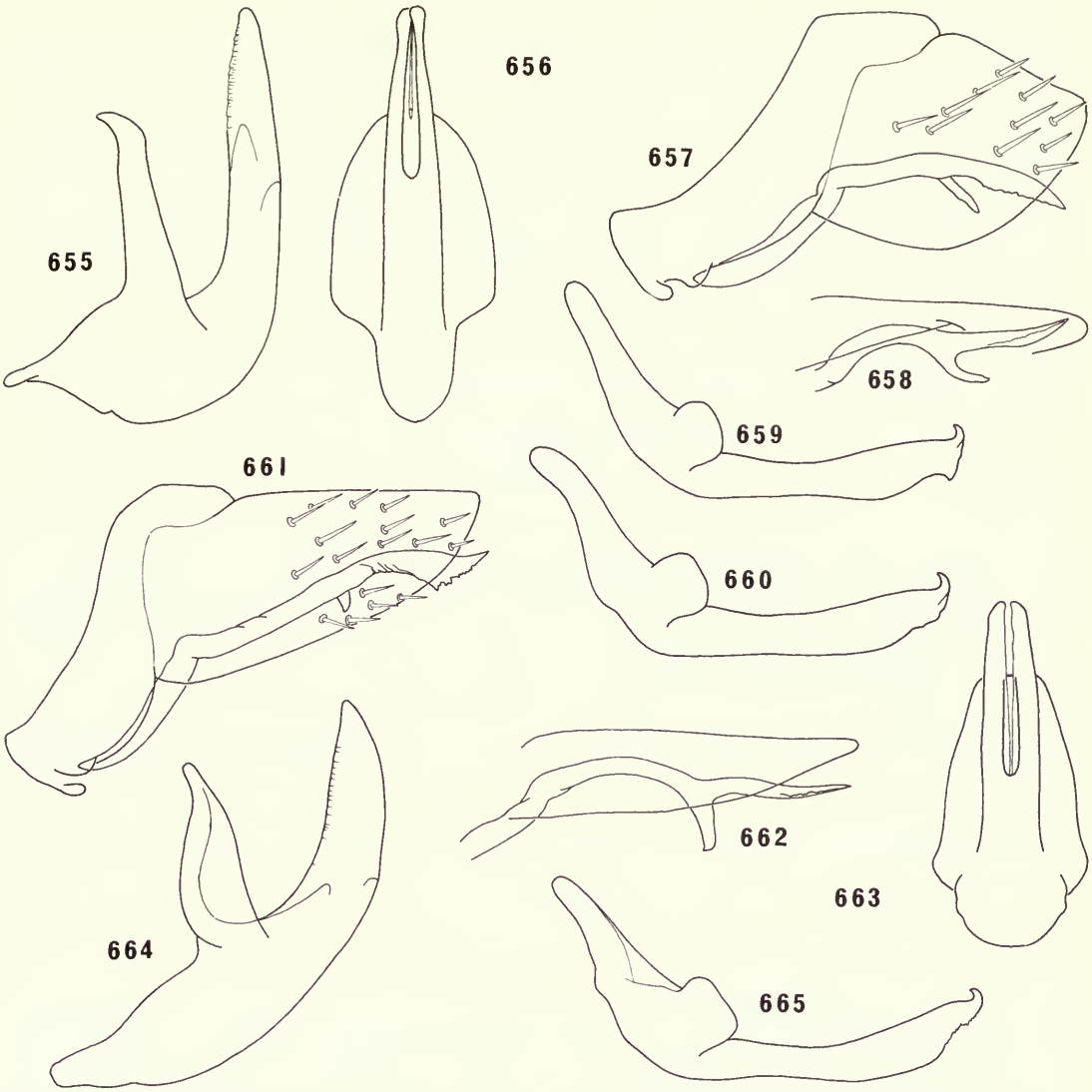
Batracomorphus hesperides sp. n.

(Figs 655–660)

Length: ♂, 4·48–4·72 mm (mean 4·60 mm).

Male genitalia. Pygophore processes stout, directed posteriorly, curving slightly ventroposteriorly over distal half, apex acute; a relatively short, finger-like process at midlength on mesal margin, directed posteromesally, sometimes more mesally or more ventrally; ventral margin distad of midlength acutely ridged and slightly serrate. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex; a triangular lamellate expansion subapically on ventral margin, rarely reduced. Aedeagus simple; shaft slender, directed dorsally; gonopore extending to midlength of shaft; anterior incision extending approximately one-third length of shaft.

REMARKS. This species is similar to *eryx* from New Guinea but differs in having more robust pygophore processes, a more gradually tapered style and the relative lengths of the gonopore and anterior incision. It also differs from *eryx* in the absence of dark brown spots on the dorsum.



Figs 655–665 655–660, *Batracomorphus hesperides*. (655, 656) aedeagus; (657) pygophore; (658) left pygophore lobe and process, ventral view; (659) style (Borneo); (660) same (Philippines). 661–665, *B. notulatus* (holotype). (661) pygophore; (662) left pygophore lobe and process, ventral view; (663, 664) aedeagus; (665) style. (For further explanation see 'Techniques and methods'.)

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, Tawau, Quoin Hill, 15–20.vii.1962 (*Y. Hirashima*) (BPBM, Type No. 12,563).

Paratypes. **Borneo**: 52 ♂, Sabah (BPBM). **Philippines**: 2 ♂, 1 ♀, Mindanao and Palawan (BPBM, ZM).

Batracomorphus notulatus Blöte

(Figs 661–665)

Batrachomorphus notulatus Blöte, 1964: 469. Holotype ♂, NEW GUINEA (RNH) [examined].

Length: ♂, 5·75 mm.

Forewings paler than body and speckled with small dark brown spots.

Male genitalia. Pygophore processes slender, directed dorsoposteriorly and turned posteriorly distally,

expanded slightly subapically with ventral margin acutely ridged and serrate, apex acute; a strong spur-like projection on mesal surface just distad of midlength directed ventromesally. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally, tapering to apex distally; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.

Remarks. This species is similar to *hesperides* from Borneo and the Philippines but differs in having the pygophore more elongate with the processes more expanded subapically and directed more dorsally, the style devoid of a subapical expansion and the aedeagus more robust and rounded basally and differing in the relative lengths of the gonopore and anterior incision. The present species is also larger and has dark brown spots on the forewings.

Distribution. New Guinea.

Material examined

Batrachomorphus notulatus Blöte, holotype ♂, **New Guinea**: Paniai, 27.viii.1939 (RNH).

Batracomorphus turnus sp. n.

(Figs 666–669)

Length: ♂, 3·92 mm.

Male genitalia. Pygophore processes slender, directed posteriorly, expanding slightly immediately distad of midlength and bifurcating into long posteriorly directed dorsal branch and a much shorter parallel ventral branch, each acute apically, base of dorsal branch weakly sclerotised and appearing banded. Styles with apical process strongly expanded over distal half, tapering to short acute dorsally hooked apex. Aedeagus simple; shaft directed dorsally; gonopore extending to midlength of shaft; anterior incision extending approximately two-thirds length of shaft.

Remarks. This species is very similar to *thoas*, also from New Guinea, but is much smaller, has the ventral branch of the pygophore process relatively shorter and the dorsal branch banded basally.

Material examined

Holotype ♂, **New Guinea**: Irian Jaya, Hollandia, iii.1945 (*K. L. Knight*) (USNM).

Batracomorphus thoas sp. n.

(Figs 670–677)

Length: ♂, 4·96–5·44 mm (mean 5·20 mm).

Male genitalia. Pygophore processes slender, directed posteriorly at base with distal half turned slightly ventroposteriorly, bifid apically with dorsal branch longer than ventral, each acute. Styles with apical process expanded over distal half, tapering to short acute dorsally hooked apex, ventral margin acute and sometimes serrate over expanded portion. Aedeagus simple; shaft slender, directed dorsally, straight or slightly recurved anteriorly; gonopore and anterior incision extending to approximately midlength of shaft.

Remarks. This species is similar to *turnus* from New Guinea but is larger and has the ventral branch of the pygophore process relatively longer and the dorsal branch uniformly sclerotised. It is known only from the north central area of Papua New Guinea.

Material examined

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

Paratype. **New Guinea**: 1 ♂, Papua New Guinea (FMNH).

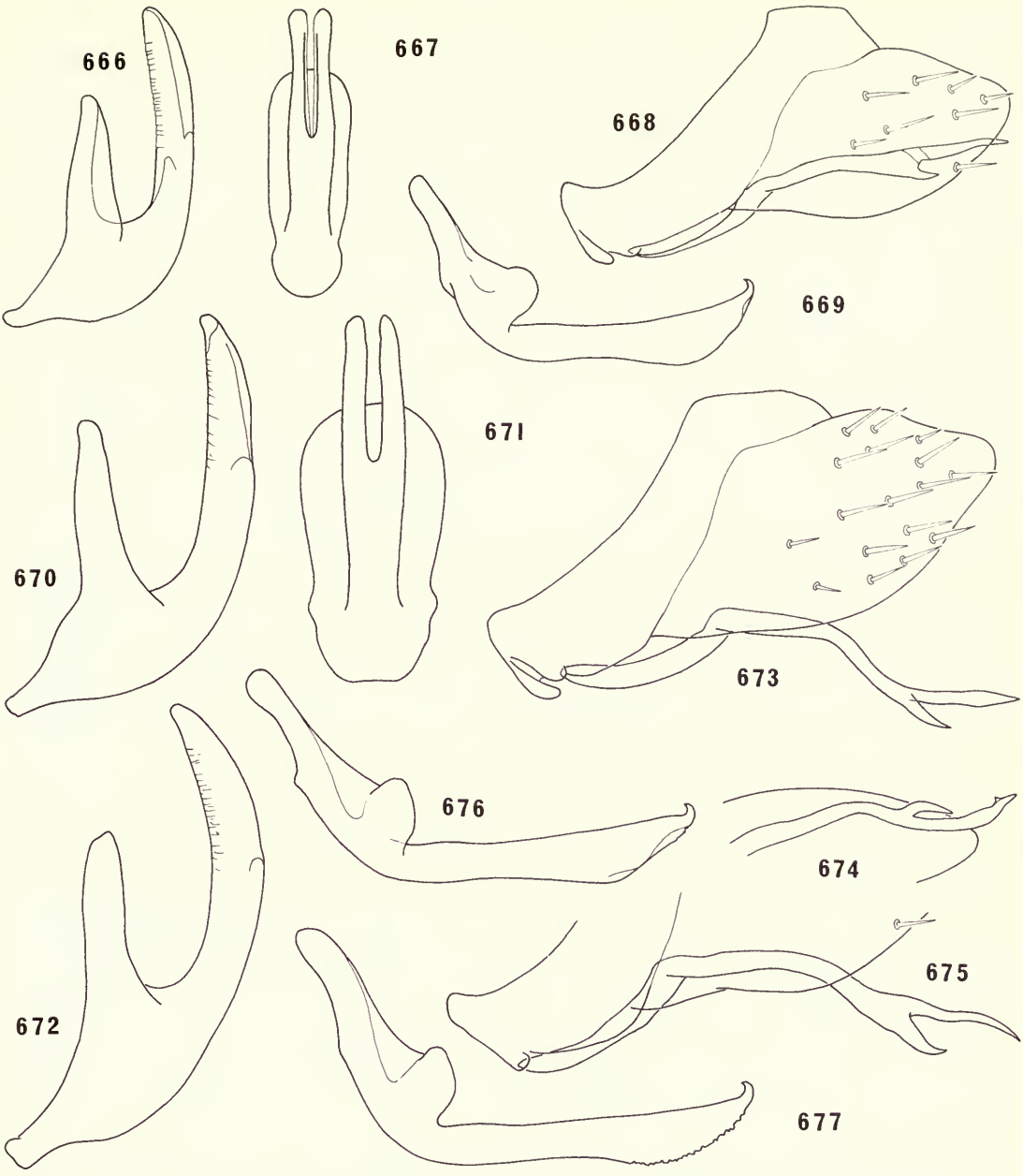
Batracomorphus orestes sp. n.

(Figs 678–691)

[*Bythoscopus tutuilanus* Osborn 1934*a*: 166 (partim). ? Misidentification.]

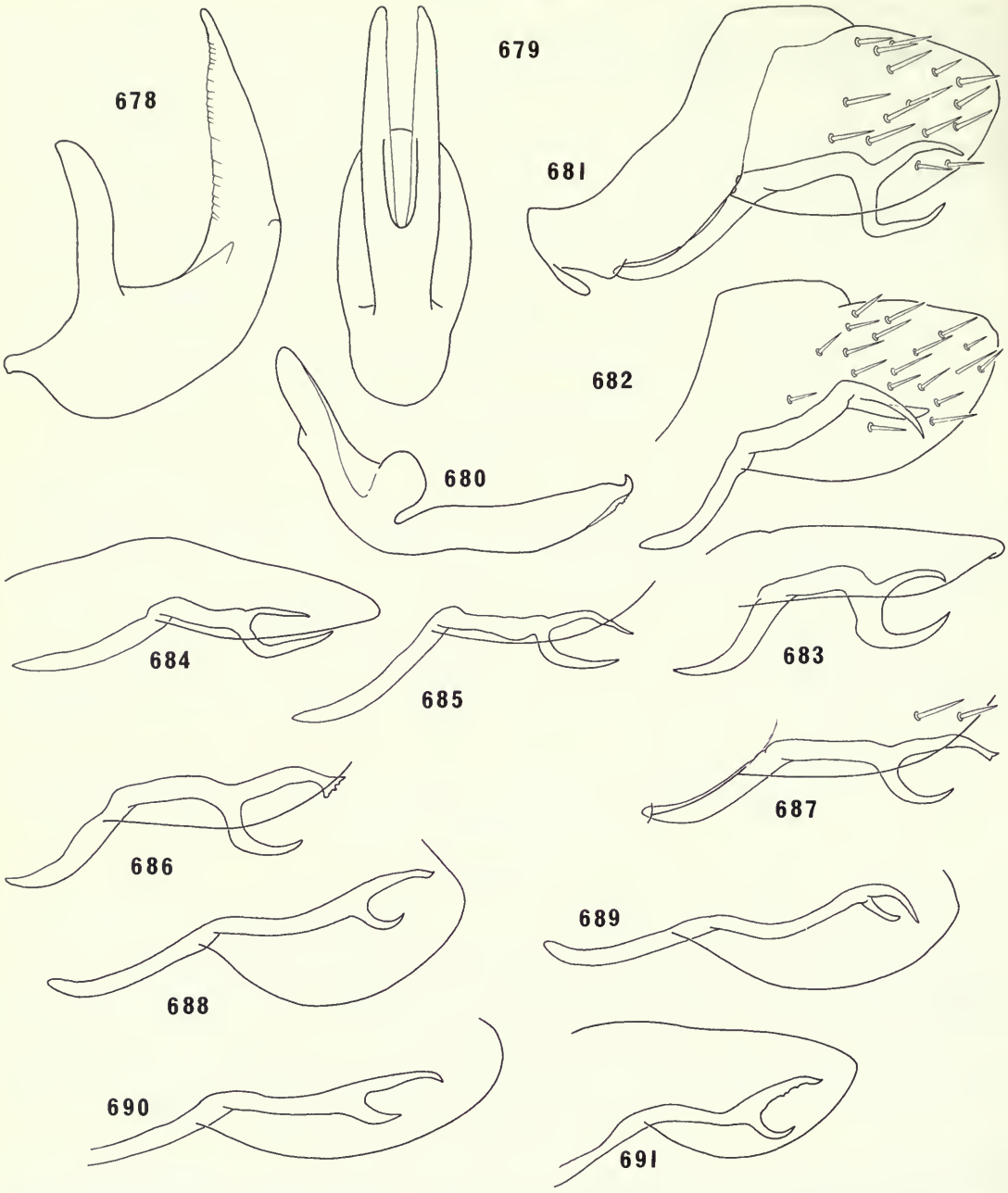
Length: ♂, 4·00–5·60 mm (mean 4·76 mm).

Male genitalia. Pygophore processes slender, directed posteriorly, bifurcating distad of midlength into a dorsal and ventral branch each directed posteriorly and of variable length and shape, their apices acute or



Figs 666–677 666–669, *Batracomorphus turnus*. (666, 667) aedeagus; (668) pygophore; (669) style. 670–677, *B. thoas*. (670, 671) aedeagus (Bulolo, New Guinea); (672) aedeagus (Finisterre Mts, New Guinea); (673) pygophore (Bulolo); (674) left pygophore lobe and process (Bulolo), ventral view; (675) left pygophore process (Finisterre Mts), left lateral view; (676) style (Bulolo); (677) same (Finisterre Mts). (For further explanation see 'Techniques and methods'.)

with dorsal branch sometimes expanded apically, the processes sometimes variably rotated on longitudinal axis so branches in same or near same horizontal plane. Styles with apical processes slightly expanded over distal half and tapering to short acute dorsally hooked apex, ventral margin acuminate and slightly serrate subapically. Aedeagus simple; shaft directed dorsally, tapering to finger-like apex in lateral aspect; gonopore extending approximately two-thirds length of shaft; anterior incision extending slightly more basad than gonopore.



Figs 678–691 *Batracomorphus orestes*. 678, 679, aedeagus; 680, style; 681, pygophore (Ceram); 682, same (Kokoda, New Guinea); 683, left pygophore lobe and process (Kokoda), ventral view; 684, same (Mindanao), ventrolateral view; 685, same (Mindanao), ventrolateral view; 686, same (Humboldt Bay, New Guinea), ventrolateral view; 687, same (Manus Island), left lateral view; 688–690, same (Samoa), left lateral view; 691, same (Samoa), ventrolateral view. (For further explanation see 'Techniques and methods'.)

REMARKS. This species, which extends from the Philippines to Samoa, is variable in the relative size and shape of the apical branches of the pygophore processes. In the Ceram and Australian (Queensland) specimens the branches are widely separated with the ventral branch slightly

longer than the dorsal and strongly angulate just basad of its midlength. In contrast, the specimen from Manus in the Bismark Archipelago has the branches closer together with the ventral one shorter than the dorsal and broadly curved rather than angulate, a development which is continued in Samoa where the ventral branch is relatively much shorter and the bifurcation situated closer to the apex of the process which is itself less robust. At the western end of the range in the Philippines the branches are again closer together than in Ceram and Queensland but with the ventral one longer or equal in length to the dorsal branch. The forms present in New Guinea are intermediate between those in Ceram and Manus. In addition to the variability in the male genitalia, the populations at the western and eastern extremities of the range also differ slightly in size and colour from those in the middle of the range. Specimens from both the Philippines and Samoa are noticeably larger than other specimens whilst in the Philippines the pronotum and forewings have small dark brown spots. Amongst the Samoan specimens one differed from normal in having a dark brown face and irregular dark brown markings on the anterior and lateral margins of the pronotum.

This species is similar to *turnus* and *thoas*, both from New Guinea, in having bifurcate pygophore processes but differs in having the branches relatively long and of more equal length over the major part of its range. The Samoan populations of the present species are most similar to *turnus* and *thoas* but *orestes* is distinguished by its more robust and strongly tapered aedeagus. A specimen of *orestes* was designated by Osborn as a male paratype of his species *Bythoscopus tutuilanus* of which the holotype is a female. In the absence of known characters to correctly associate males and females of this genus *tutuilanus* is treated here as a nomen dubium.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Irian Jaya, Humboldt Bay District, Bewani Mts, 400 m, vii.1937 (*W. Stüber*) (BMNH).

Paratypes. **Australia**: 1 ♂ (AMNH). **Ceram**: 2 ♂ (USNM). **Manus**: 1 ♂ (ZM). **New Britain**: 1 ♂ (BPBM). **New Guinea**: 1 ♂, Papua New Guinea (BMNH). **Philippines**: 2 ♂, Mindanao (FMNH). **Samoa**: 11 ♂, 6 ♀, Savaii and Tutuila (BMNH, BPBM).

Batracomorphus proserpine sp. n.

(Figs 692–697)

Length: ♂, 4·16–4·48 mm (mean 4·30 mm).

Forewing punctations usually dark brown.

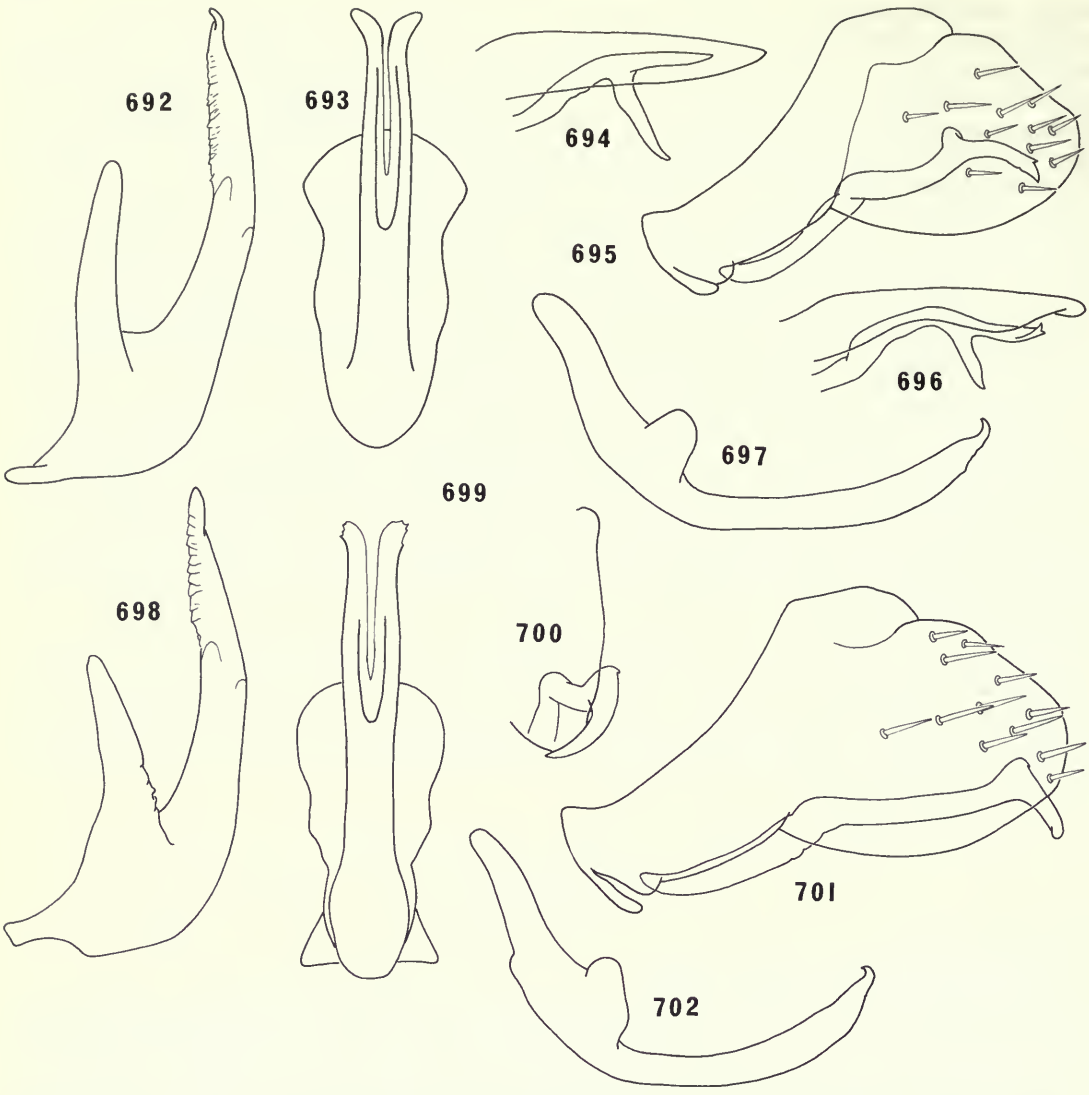
Male genitalia. Pygophore processes directed posteriorly, turned dorsad and bifurcate near midlength with one branch directed posteriorly and the other medially, the posterior branch usually slightly longer than medial, each with apex acute and turned slightly ventrally, the posterior branch with a small spur-like projection sometimes present subapically on dorsal margin. Styles with apical process elongate, slender, of uniform width or only slightly expanded over distal half, curving slightly posterodorsally, tapering distally to short acute dorsally hooked apex. Aedeagus simple; shaft slender, directed dorsally, tapering distally in lateral aspect and terminating in a pair of small laterally diverging lamellate lobes; gonopore extending to just basad of midlength of shaft; anterior incision slightly shorter than gonopore.

REMARKS. This species is one of a group of four closely related species (*proserpine, coeus, thalia* and *triton*) occurring in Borneo, West Malaysia and Sumatra, characterised by a slender and apically lobed aedeagus, a slender elongate style and pygophore processes that are either bifurcate or a modification thereof. The present species is most closely related to *coeus* from Borneo but differs in having the two branches of the pygophore process well developed and of approximately equal length. The single specimen from West Malaysia has the base of the aedeagus less robust than illustrated and intermediate between the normal shape in *proserpine* and that in *thalia* and *triton*. This specimen also lacks dark brown punctations on the forewings.

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, Tawau, Quoin Hill, Cocoa Research Station, 25.ix.1962 (*Y. Hirashima*) (BPBM, Type No. 12,564).

Paratypes. **Borneo**: 14 ♂, Sabah (BPBM). **West Malaysia**: 1 ♂ (BMNH).



Figs 692–702 692–697, *Batracomorphus proserpine*. (692, 693) aedeagus; (694) left pygophore lobe and process, ventral view; (695) pygophore; (696) left pygophore lobe and process, ventral view; (697) style. 698–702, *B. coeus*. (698, 699) aedeagus; (700) left pygophore lobe and process, dorsoposterior view; (701) pygophore; (702) style. (For further explanation see 'Techniques and methods'.)

Batracomorphus coeus sp. n.

(Figs 698–702)

Length: ♂, 4·16–4·48 mm (mean 4·30 mm).

Forewings with very small dark brown spots.

Male genitalia. Pygophore processes slender, directed posteriorly over basal three-fourths then slightly expanded dorsally and turned abruptly ventrolaterally, apex acute, a small spur-like projection on dorsomesal margin of dorsal expansion. Styles with apical process elongate, slender, of uniform width or only slightly expanded over distal half, curving posterodorsally throughout length, tapering distally to short acute dorsally hooked apex. Aedeagus simple; shaft slender, directed dorsally, tapering distally in lateral aspect, lateral margins diverging slightly at apex; gonopore extending to near midlength of shaft; anterior incision slightly shorter than gonopore.

REMARKS. The present species is most closely related to *proserpine* but differs in having the pygophore processes relatively longer, the bifurcation closer to the apex and the mesal branch reduced to a short spur-like projection. (See additional remarks under *proserpine*.)

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sarawak, foot of Mt Dulit, junction of rivers Tinjar and Lejok, 2.ix.1932 (*B. M. Hobby and A. W. Moore*) (BMNH).

Paratypes. **Borneo**: 21 ♂, Sabah (BPBM).

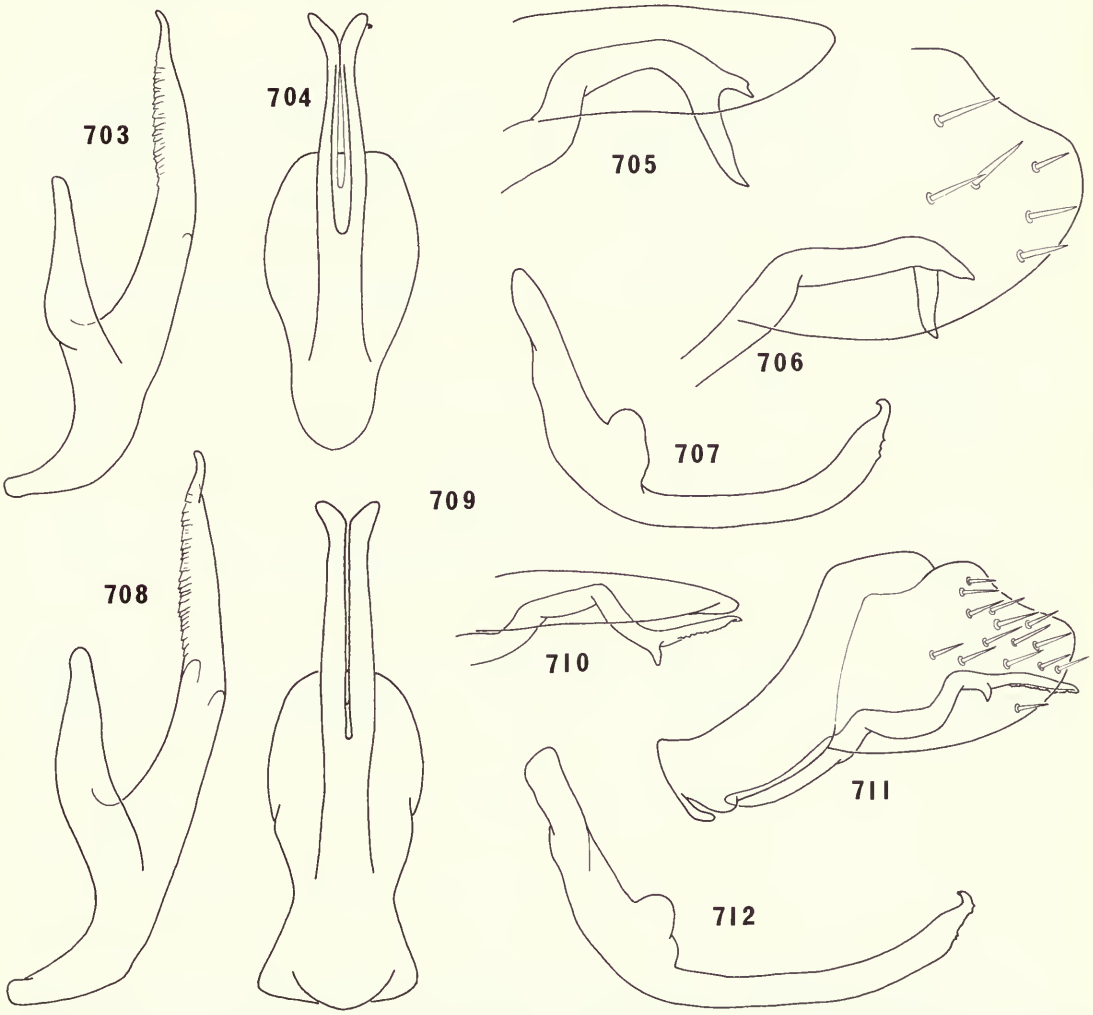
Batracomorphus thalia sp. n.

(Figs 703–707)

Length: ♂, 4·48 mm.

Forewings with small brown tubercles.

Male genitalia. Pygophore processes robust, directed posteriorly to midlength then turned posteromedially and bifurcating into a relatively short posteriorly directed branch and a much longer and more



Figs 703–712 703–707, *Batracomorphus thalia*. (703, 704) aedeagus; (705) left pygophore lobe and process, ventral view; (706) same, left lateral view; (707) style. 708–712, *B. triton*. (708, 709) aedeagus; (710) left pygophore lobe and process, ventral view; (711) pygophore; (712) style. (For further explanation see 'Techniques and methods'.)

robust medially directed branch, each acute apically. Styles with apical process elongate, slender, of uniform width, turned dorsally over distal half, tapering distally to short acute dorsally hooked apex. Aedeagus simple; shaft slender, directed dorsally, tapering to apex over distal half in lateral aspect, terminating in a pair of small laterally diverging lamellate lobes; gonopore extending to near midlength of shaft; anterior incision approximately equal in length to gonopore.

REMARKS. The present species is most closely related to *prosperpine* but differs in having more robust pygophore processes with the posteriorly directed branch much smaller than the medial branch, the apical process of the style turned abruptly dorsally near apex and the aedeagus less robust basally. (See additional remarks under *proserpine*.)

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sarawak, foot of Mt Dulit, junction of rivers Tinjar and Lejok, 2.ix.1932 (*B. M. Hobby and A. W. Moore*) (BMNH).

Batracomorphus triton **sp. n.**

(Figs 708–712)

Length: ♂, 4·96 mm.

Forewings with small dark brown tubercles.

Male genitalia. Pygophore processes slender, directed posteriorly at base, then abruptly dorsomesally over mid third, then abruptly posteriorly, apex acute, a spur-like projection on ventral margin at proximal end of distal third with ventral margin distal to spur acutely ridged. Styles with apical process elongate, slender, of uniform width, curving dorsally over distal half, tapering distally to short acute dorsally hooked apex. Aedeagus simple; shaft slender, directed dorsally, tapering to apex over distal half in lateral aspect, terminating in a pair of small laterally diverging lamellate lobes; gonopore extending to just basad of midlength of shaft; anterior incision slightly shorter than gonopore.

REMARKS. The present species is most closely related to *thalia* but has more slender pygophore processes with the medial branch reduced and directed ventrally. (See additional remarks under *proserpine*.)

MATERIAL EXAMINED

Holotype ♂, **Sumatra**: Mt Dempo, 1220 m (*C. J. Brooks*) (BMNH).

Batracomorphus montanus (Evans) **comb. n.**

(Figs 713–720)

Acojassus montanus Evans, 1972: 656. Holotype ♂, NEW GUINEA (BPBM) [examined].

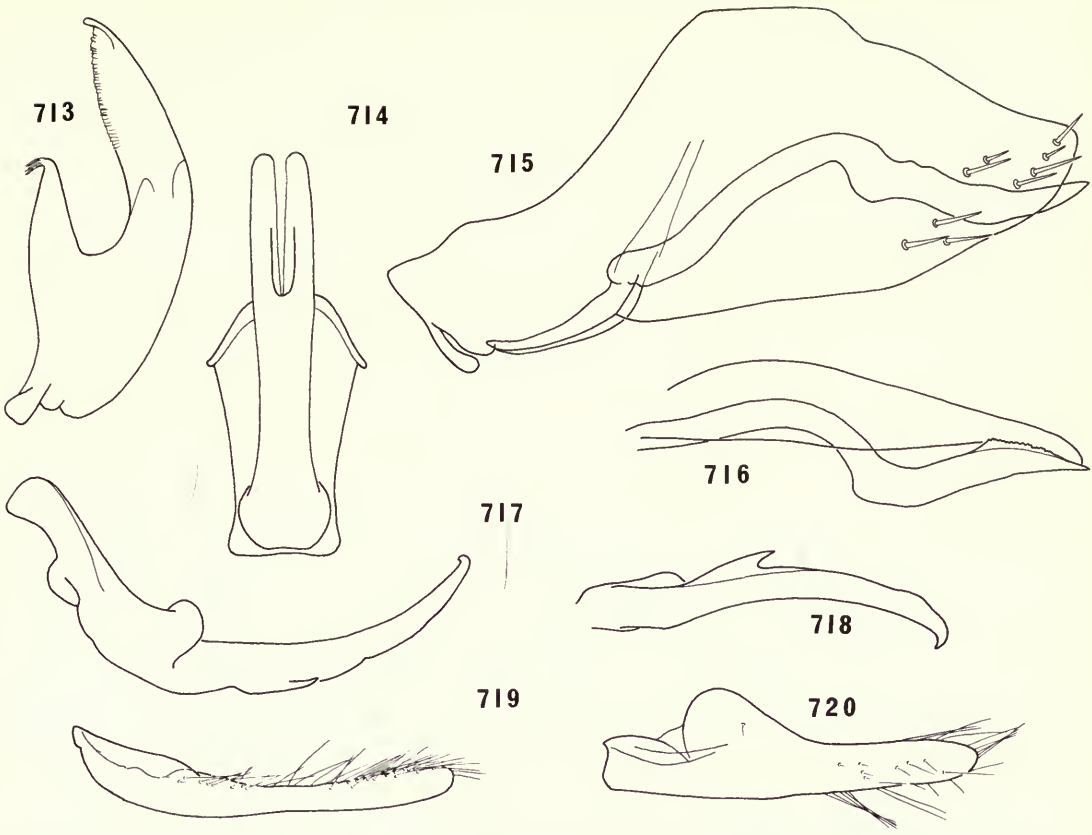
Length: ♂, 9·25 mm.

Forewing punctations whitish.

Vertex slightly longer medially than next eyes, flattened and acutely rounded to face. Pronotum with lateral margins more or less parallel. Forewings with few adventitious cross veins apically.

Male genitalia. Pygophore processes elongate, directed dorsoposteriorly over basal half, curved medially at midlength then abruptly posteriorly, tapered to acute apex with weakly serrate lamellate expansion subapically on lateral margin. Subgenital plates normal in shape, as in *harpago*, but with setae on dorsal surface only, one row along medial edge and another along lateral edge, from basal lobe to apex. Styles with apical process slender, curving dorsoposteriorly, tapering gradually from midlength to short acute dorsally hooked apex; a posteriorly directed thorn-like projection on ventrolateral margin just basad of midlength. Aedeagus simple; shaft directed dorsally, curving anterodorsally from midlength, tapering to apex in lateral aspect; gonopore extending to just basad of midlength of shaft; anterior incision extending slightly more basad than gonopore.

REMARKS. This species is closely related to *leda* from New Guinea but is much larger and with the vertex more acutely rounded to the face. It also has more robust pygophore processes and the gonopore and anterior incision relatively shorter. These two species, together with *viridinervis* and *geryon,* differ from most in that the subgenital plates whilst possessing the usual shape, as in *harpago*, lack the row of setae on the ventral margin. All four species, which occur only in New Guinea, are also distinguished by having the vertex flattened and acutely rounded to the face.



Figs 713–720 *Batracomorphus montanus* (holotype). 713, 714, aedeagus; 715, pygophore; 716, left pygophore lobe and process, ventral view; 717, style; 718, same, ventral view; 719, left subgenital plate, left lateral view; 720, same, ventral view. (For further explanation see 'Techniques and methods'.)

The species *montanus* and *leda* also differ from most by having the vertex slightly longer medially than next to the eyes. The present species shows certain similarities to *ganymede* from New Guinea in the shape of the pygophore processes and aedeagus but *ganymede* has a normal shaped style and subgenital plates as well as being much smaller with a normal shaped vertex.

DISTRIBUTION. New Guinea.

MATERIAL EXAMINED

Acojassus montanus Evans, holotype ♂, **New Guinea**: Irian Jaya, Wisselmeren: Enarotadi, 1800 m, 3.viii.1955 (*J. L. Gressitt*) (BPBM).

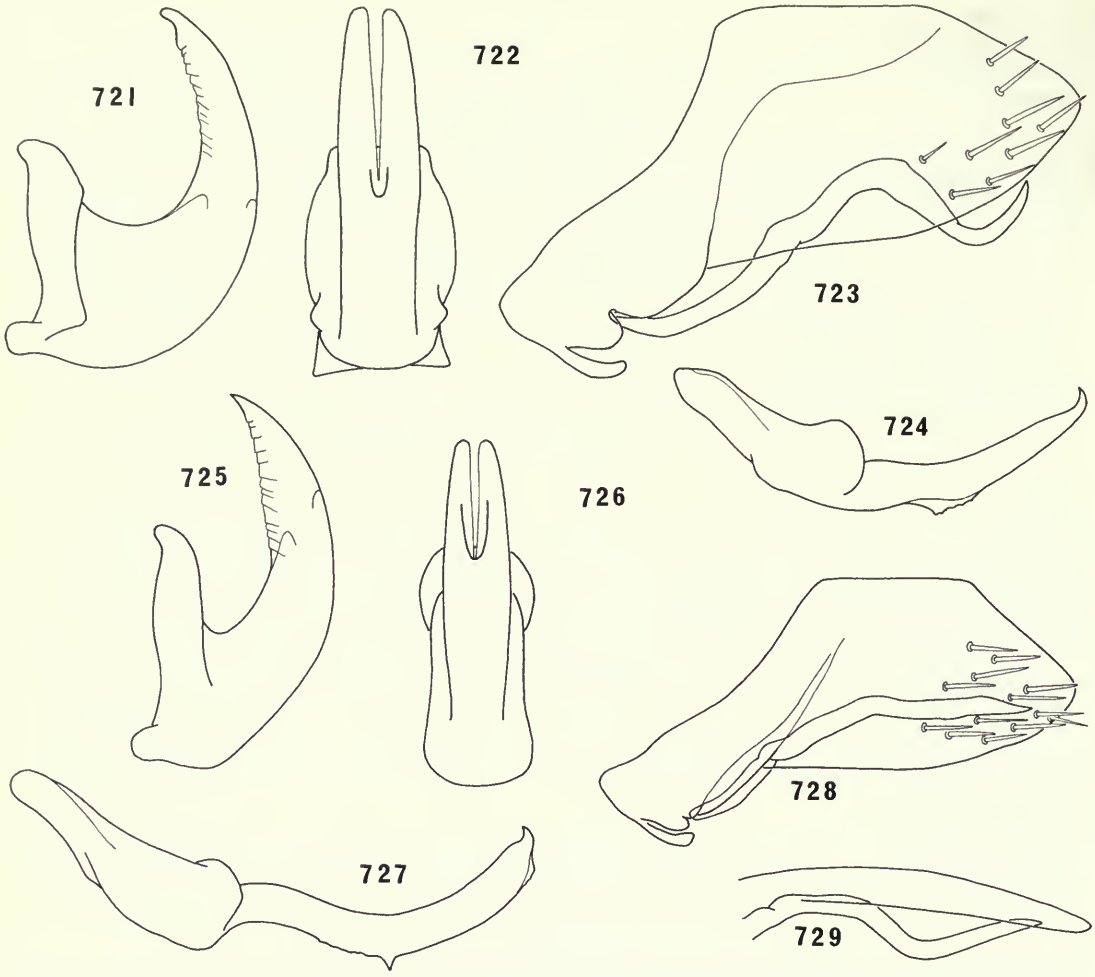
Batracomorphus leda sp. n.

(Figs 721–724)

Length: ♂, 5·36 mm.

Vertex slightly longer medially than next eyes, flattened and acutely rounded to face.

Male genitalia. Pygophore with dorsal surface much longer than normal; processes slender, directed dorsoposteriorly over basal third then abruptly ventroposteriorly for approximately one-third then dorsoposteriorly over distal portion, apex acute. Subgenital plates normal in shape, as in *harpago*, but without ventral row of setae. Styles with apical process slender, curving dorsoposteriorly, tapering gradually from midlength to short acute dorsally hooked apex, ventral margin acutely ridged for short distance immediately basad of midlength. Aedeagus simple; shaft directed dorsally and curving anterodorsally, tapering to short finger-like apex in lateral aspect; gonopore and anterior incision equal in length, extending to near base of shaft.



Figs 721–729 721–724, *Batracomorphus leda*. (721, 722) aedeagus; (723) pygophore; (724) style. 725–729, *B. viridinervis* (holotype). (725, 726) aedeagus; (727) style; (728) pygophore; (729) left pygophore lobe and process, ventral view. (For further explanation see 'Techniques and methods'.)

Remarks. The present species is most closely related to *montanus* but is smaller and has the vertex less acutely rounded to the face. The pygophore processes are also less robust and the style lacks a thorn-like projection on its ventral margin. (See additional remarks under *montanus*.)

Material examined

Holotype ♂, **New Guinea**: Papua New Guinea, Morobe District, Finisterre Mts, Mt Abilala, 2745 m, 19–22.xi.1964 (*M. E. Bacchus*) (BMNH).

Batracomorphus viridinervis Blöte

(Figs 725–729)

Batrachomorphus viridinervis Blöte, 1964: 466. Holotype ♂, New Guinea (RNH) [examined].

Length: ♂, 6·5 mm.

Vertex flattened.

Male genitalia. Pygophore processes slender, directed dorsoposteriorly at base, then posteromesally and finally posterolaterally, apex acute. Subgenital plates normal in shape, as in *harpago*, but without

ventral row of setae; a multiseriate row of setae dorsally over distal half and a small group on laterodorsal margin of lobe only. Styles with apical process slender, slightly sinuate with distal half curving posterodorsally, of uniform width, tapering subapically to short acute dorsally hooked apex; ventral margin acuminate subapically and with a tooth-like projection at midlength. Aedeagus simple; shaft directed dorsally and curving anterodorsally, tapering to acute apex in lateral aspect; gonopore extending approximately one-third length of shaft; anterior incision extending to near midlength of shaft.

REMARKS. The present species is most closely related to *leda* but is larger and has the vertex of uniform length. The pygophore processes are also less sinuate and the style of uniform width to near the apex. (See additional remarks under *montanus*.)

DISTRIBUTION. New Guinea.

MATERIAL EXAMINED

Batrachomorphus viridinervis Blöte, holotype ♂, **New Guinea**: Paniai, 16.ix.1939 (RNH).

Batracomorphus geryon sp. n.

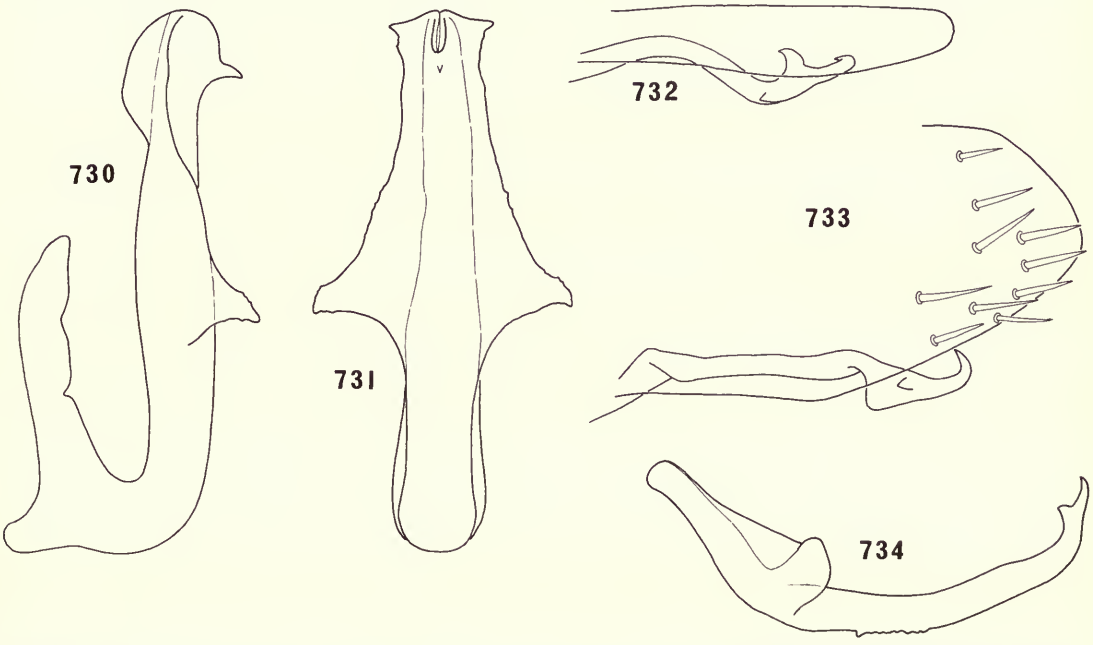
(Figs 730–734)

Length: ♂, 6·00–6·24 mm (mean 6·12 mm).

Vertex flattened with anterior margin slightly ridged and acutely rounded to face.

Male genitalia. Pygophore processes slender, directed posteriorly, expanded foot-like subapically and terminating in acute dorsally curving apex, a short acute projection near midlength of lateral margin of expansion. Subgenital plates normal in shape, as in *harpago*, but with ventral row of hair-like setae at midlength absent. Styles with apical process elongate, slender, of approximately uniform width, apex turned abruptly dorsally, bifid. Aedeagus with shaft slender, directed dorsally; lateral margins expanded fin-like along distal half, turned posterolaterally, increasing in width towards base of shaft and terminating abruptly; anterior margin of shaft expanded at apex into a pair of lobe-like fins extending round apex of shaft and terminating on posterior margin in short medial beak-like process immediately basad of gonopore; gonopore and anterior incision equal in length, very short.

REMARKS. This species, together with *montanus, leda* and *viridinervis*, differ from most in the shape of the vertex and subgenital plates, as described for *montanus*. The present species,



Figs 730–734 *Batracomorphus geryon*. 730, 731, aedeagus; 732, left pygophore lobe and process, ventral view; 733, same, left lateral view; 734, style. (For further explanation see 'Techniques and methods'.)

however, shows no relationship to the others in this group in the shape of the male genitalia. The only species to which it shows any similarity is *itys* but it is much larger than this species and differs in the shape of the vertex and subgenital plates. It also differs from *itys* in the actual shape of the aedeagus, styles and pygophore processes.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

Paratype. **New Guinea**: 1 ♂, same data as holotype (BMNH).

Batracomorphus acestes sp. n.

(Figs 735–740)

Length: ♂, 5·68–5·92 mm (mean 5·84 mm).

Vertex, pronotum, scutellum and forewings sparsely speckled with small dark brown spots.

Vertex flat.

Male genitalia. Pygophore processes elongate, slender, directed posteriorly and curving dorsoposteriorly, vermiculate over distal half, apex acute. Subgenital plates normal in shape, as in *harpago*, but with basal stem expanded laterally and obscuring lobe; long hair-like setae in basal group on dorsolateral margin and along dorsal margin only. Styles with apical process elongate, slender, of approximately uniform width, tapering distally to acute upturned apex. Aedeagus robust, enlarged basally; shaft relatively slender, directed dorsally and recurved anterodorsally; gonopore extending approximately half length of shaft; anterior incision extending approximately one-third length of shaft.

REMARKS. The present species is one of a group of 10 (*acestes, thetis, tityos, misenus, pustulatus, alceus, antenor, orithyia, tereus* and *ufens*) which are characterised by having the vertex flattened, the subgenital plates devoid of hair-like setae on the ventral margin and with the basal lobe obscured by the lateral expansion of the basal stem, the aedeagus enlarged basally and the shaft recurved anteriorly, the apical process of the style elongate and slender with the apex acute and upturned, and the pygophore processes slender. The species in this group, which extends from the Philippines and Borneo across to New Guinea, the Bismark Archipelago and the Solomon Islands, resemble *curvatus* in the basic shape of the aedeagus and style and *ilia, sarpedon* and *cocles* in the shape of the pygophore processes but differ from all four in the shape of the vertex and subgenital plates. The present species is most closely related to *thetis* from the Philippines but differs in the shape of the aedeagus which is less robust basally, has a relatively larger and less recurved shaft and a much shorter gonopore.

MATERIAL EXAMINED

Holotype ♂, **New Ireland**: Lemkamin, 17.iv.1962 (ZM).

Paratypes. **New Britain**: 2 ♂ (BPBM).

Batracomorphus thetis sp. n.

(Figs 741–745)

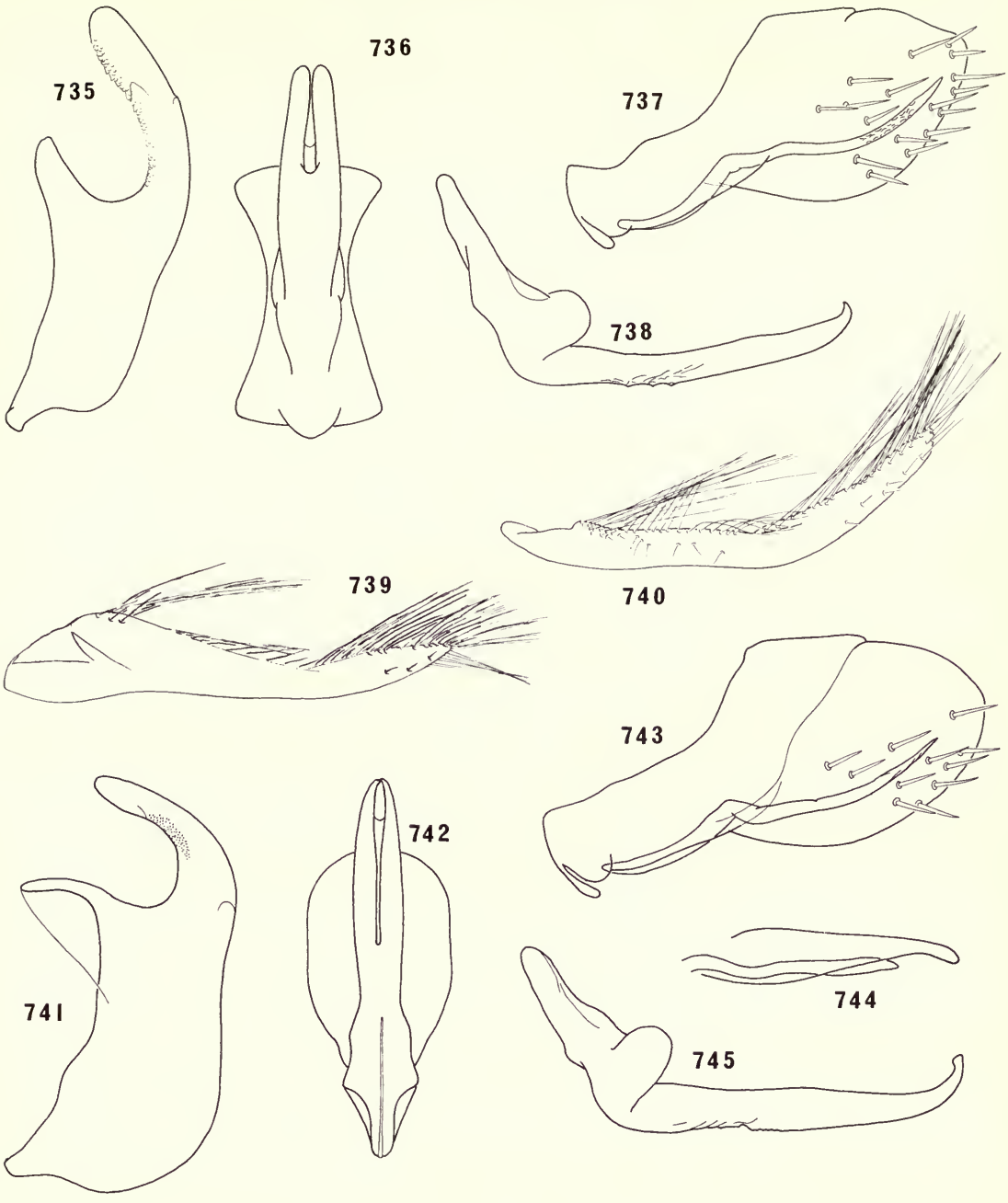
Length: ♂, 5·12–5·92 mm (mean 5·65 mm).

Vertex, pronotum, scutellum and forewings speckled with small dark brown spots.

Vertex flat.

Male genitalia. Pygophore processes slender, directed posteriorly, curving gradually dorsoposteriorly, tapering gradually to slender acute apex in lateral aspect, apical portion slightly spatulate. Subgenital plates as in *acestes*. Styles with apical process elongate, slender, tapering gradually over distal half to narrowly rounded upturned apex. Aedeagus robust, strongly enlarged basally; shaft relatively short, slender, directed dorsally then strongly recurved anteriorly; gonopore extending to near base of shaft; anterior incision short.

REMARKS. The present species is most closely related to *tityos* from the Philippines but is smaller, has a more slender shaft to the aedeagus, a relatively longer gonopore and the apical portion of the pygophore process directed posteriorly rather than posterolaterally. (See additional remarks under *acestes*.)



Figs 735–745 735–740, *Batracomorphus acestes*. (735, 736) aedeagus; (737) pygophore; (738) style; (739) left subgenital plate, ventral view; (740) same, left lateral view. 741–745, *B. thetis*. (741, 742) aedeagus; (743) pygophore; (744) left pygophore lobe and process, ventral view; (745) style. (For further explanation see 'Techniques and methods'.)

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Luzon, Benguet, Baguio (*Baker*) (USNM).

Paratypes. **Philippines**: 3 ♂, 2 ♀, Luzon (USNM).

Batracomorphus tityos sp. n.

(Figs 746–750)

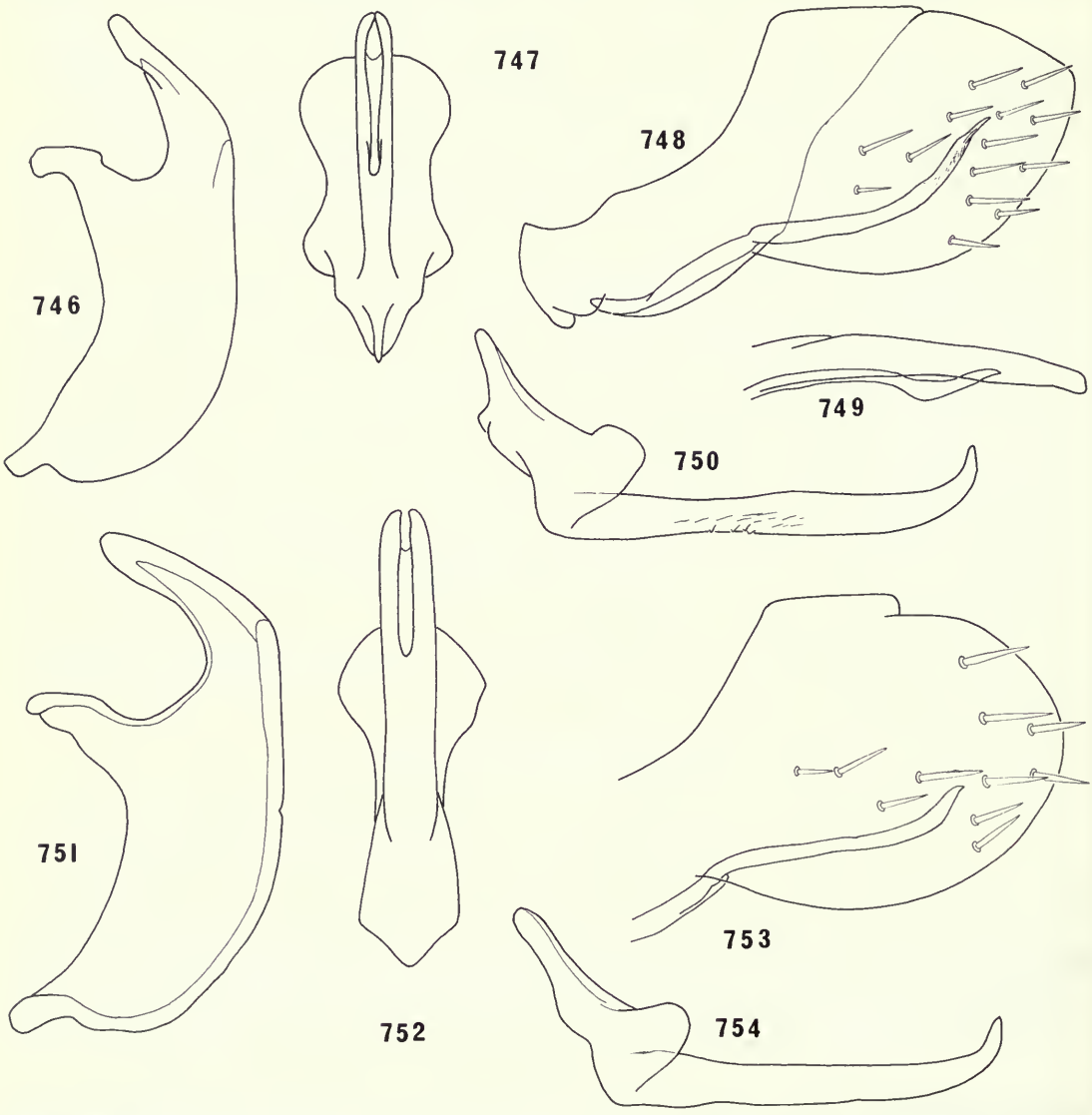
Length: ♂, 6·48 mm.

Vertex, pronotum, scutellum and forewings speckled with small dark brown spots.

Vertex flat.

Male genitalia. Pygophore processes slender, directed posteriorly, turning dorsoposteriorly at mid-length, apical third turned slightly posterolaterally, apex acute. Subgenital plates as in *acestes*. Styles with apical process elongate, slender, of approximately uniform width, tapering distally to acute upturned apex. Aedeagus robust, enlarged basally; shaft relatively short, directed dorsally then curving anterodorsally, tapering to apex with a pair of small lamellate expansions subapically on anterior margin; gonopore extending approximately three-fourths length of shaft; anterior incision short.

Remarks. The present species is most closely related to *thetis* from the Philippines but is larger



Figs 746–754 746–750, *Batracomorphus tityos*. (746, 747) aedeagus; (748) pygophore; (749) left pygophore lobe and process, ventral view; (750) style. 751–754, *B. misenus*. (751, 752) aedeagus; (753) pygophore; (754) style. (For further explanation see 'Techniques and methods'.)

and has the shaft of the aedeagus more robust, less recurved and with subapical expansions, and the pygophore processes turned more abruptly dorsoposteriorly and with apical third turned slightly posterolaterally. (See additional remarks under *acestes*.)

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Mindanao, Misamis Or., Mt Empagatao, 1050–1200 m, 19–30.iv.1961 (*H. M. Torrevillas*) (BPBM, Type No. 12,565).

***Batracomorphus misenus* sp. n.**

(Figs 751–754)

Length: ♂, 4·88–6·00 mm (mean 5·42 mm).

Vertex, pronotum, scutellum and forewings speckled with small dark brown spots.

Vertex slightly flattened.

Male genitalia. Pygophore processes elongate, slender, directed posteriorly and turned abruptly dorsally subapically, apex acute. Subgenital plates as in *acestes*. Styles with apical process elongate, slender, of approximately uniform width, tapering distally to acute upturned apex. Aedeagus robust, enlarged basally; shaft relatively short, directed dorsally and recurved anteriorly; gonopore extending to near midlength of shaft; anterior incision very short.

REMARKS. The present species is closely related to *tityos* from the Philippines but has the pygophore processes turned dorsad subapically rather than at their midlength and the shaft of the aedeagus more recurved. (See additional remarks under *acestes*.)

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sarawak, foot of Mt Dulit, junction of rivers Tinjar and Lejok, 29.viii.1932 (*B. M. Hobby & A. W. Moore*) (BMNH).

Paratypes. **Borneo**: 4 ♂, same data as holotype except 27.viii–26.ix.1932 (BMNH).

***Batracomorphus pustulatus* Blöte**

(Figs 755–758)

Batrachomorphus pustulatus Blöte, 1964: 469. Holotype ♂, NEW GUINEA (RNH) [examined]

Length: ♂, 6·00–8·30 mm (mean 7·15 mm).

Vertex, pronotum, scutellum and forewings speckled with small dark brown spots.

Vertex flat.

Male genitalia. Pygophore processes long, slender, directed posteriorly over basal half then turned dorsoposteriorly, apex acute and turned posteriorly, vermiculate over distal half. Subgenital plates as in *acestes*. Styles with apical process elongate, slender, of uniform width, tapering distally to acute upturned apex. Aedeagus robust, enlarged basally; shaft relatively short, directed dorsally and turned anterodorsally at midlength; anterior margin trough-like along its length and with small rounded teeth-like projections; base with posterior margin acutely ridged and keel-like medially; gonopore extending to near midlength of shaft; anterior incision extending approximately one-third length of shaft.

REMARKS. The present species is closely related to *thetis* and *tityos* from the Philippines but has the shaft of the aedeagus less recurved and the gonopore relatively shorter and the pygophore processes longer, turned more abruptly posterodorsally and with the apex turned posteriorly. (See additional remarks under *acestes*).

DISTRIBUTION. New Britain, New Guinea.

MATERIAL EXAMINED

Batrachomorphus pustulatus Blöte, holotype ♂, **New Guinea**: Paniai, 15.ix.1939 (RNH).

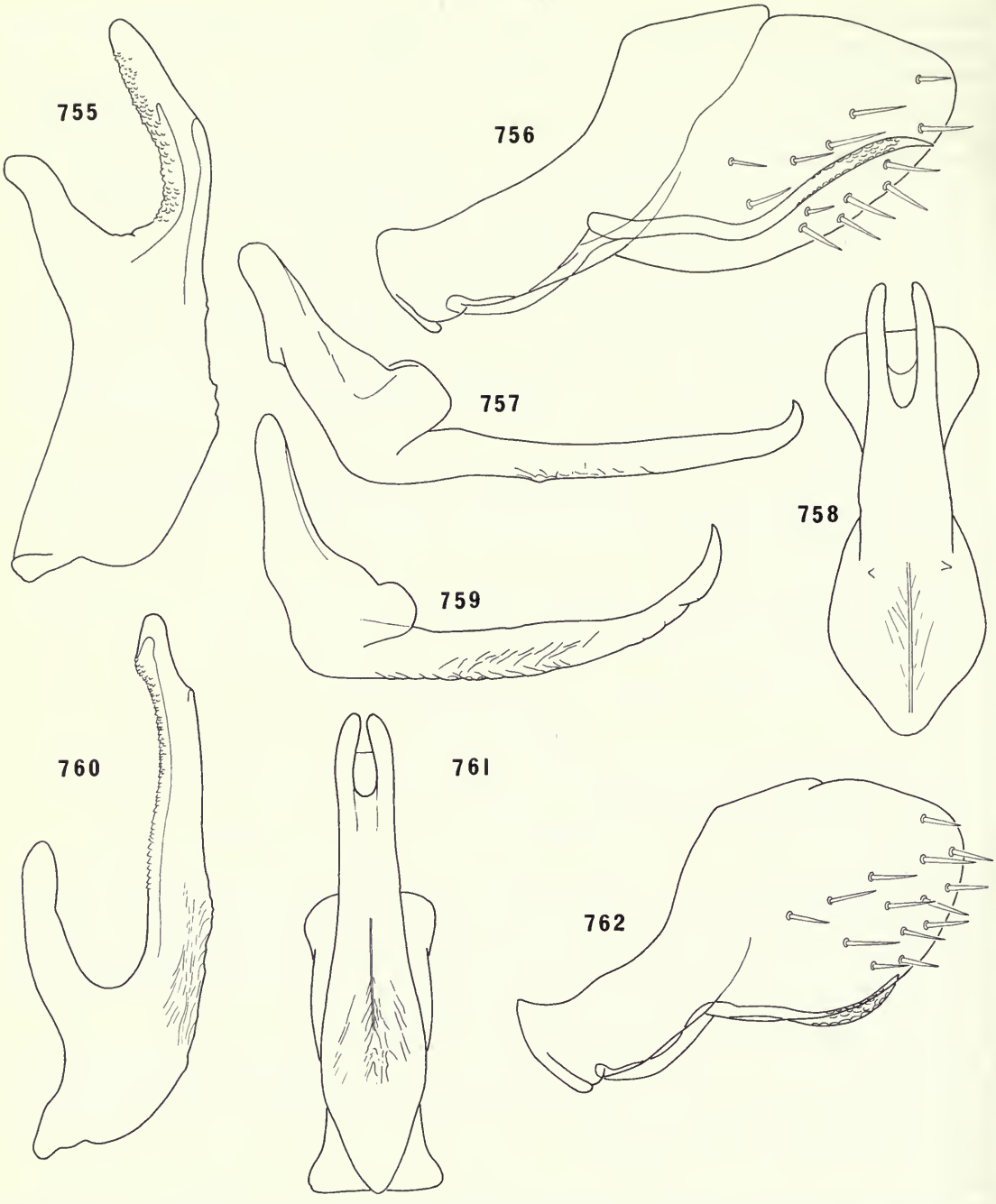
New Guinea: 1 ♂, Irian Jaya (USNM).

***Batracomorphus alceus* sp. n.**

(Figs 759–762)

Length: ♂, 6·72 mm.

Vertex, pronotum, scutellum and forewings sparsely speckled with small dark brown spots.



Figs 755–762 755–758, *Batracomorphus pustulatus* (holotype). (755) aedeagus; (756) pygophore; (757) style; (758) aedeagus. 759–762, *B. alceus*. (759) style; (760, 761) aedeagus; (762) pygophore. (For further explanation see 'Techniques and methods'.)

Vertex flat; forewing venation normal but with additional costal cross veins adjacent to outer subapical cell.

Male genitalia. Pygophore processes slender, directed posteriorly with distal half vermiculate and curving dorsally, apex acute. Subgenital plates as in *acestes*. Styles with apical process elongate, slender, of uniform width to midlength with distal half curving dorsally and tapering to acute apex. Aedeagus slender,

not enlarged basally; shaft elongate, directed dorsally, posterior margin acutely ridged medially over basal half; gonopore approximately one-fifth length of shaft; anterior incision approximately half length of gonopore.

REMARKS. The present species is one of a group of 10 characterised by the shape of the vertex and male genitalia as described under *acestes*. It differs from all other species in this group in having a slender rather than robust aedeagus, with a dorsally directed rather than recurved shaft, but is closely related to them in the shape of the style, pygophore processes, subgenital plates and vertex.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Markham River valley, Nadzab, viii.1944 (*K. V. Krombein*) (USNM).

Batracomorphus antenor sp. n.

(Figs 763–767)

Length: ♂, 5·12–5·20 mm (mean 5·16 mm).

Vertex, pronotum, scutellum and forewings speckled with small dark brown spots.

Vertex flattened.

Male genitalia. Pygophore processes slender, directed mesally then immediately dorsad near base, apex acute. Subgenital plates as in *acestes*. Styles with apical process elongate, of uniform width to near apex then tapering to short, dorsally directed, finger-like apex. Aedeagus robust, enlarged basally; shaft relatively short, directed dorsally and strongly recurved anteriorly; gonopore extending to near base of shaft; anterior incision very short.

REMARKS. The present species is most closely related to *thetis* from the Philippines but differs in having the pygophore processes turned abruptly dorsad at their base. (See additional remarks under *acestes*.)

MATERIAL EXAMINED

Holotype ♂, **New Britain**: Gazelle Peninsula, Mt Sinewit, 900 m, 5–14.xi.1962 (*J. Sedlacek*) (BPBM, Type No. 12,566).

Paratype. **New Britain**: 1 ♂, same data as holotype except 14–16.xi.1962 (BPBM).

Batracomorphus orithyia sp. n.

(Figs 768–772)

Length: ♂, 4·72 mm.

Vertex, pronotum, scutellum and forewings mottled with small dark brown spots.

Vertex flat.

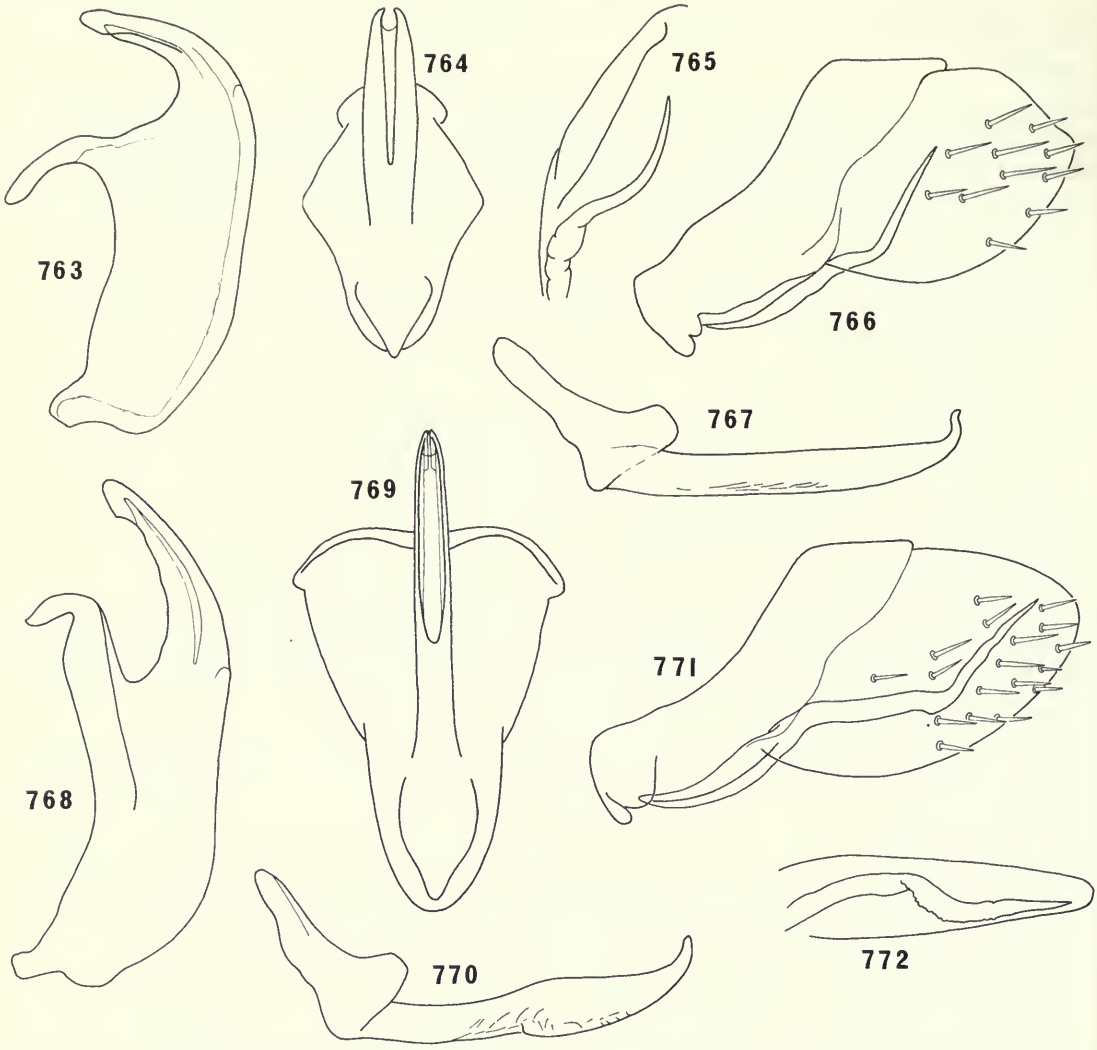
Male genitalia. Pygophore processes slender, directed posteriorly to midlength and then abruptly dorsoposteriorly, apex acute. Subgenital plates as in *acestes*. Styles with apical process elongate, expanded over distal half and then tapering to upturned finger-like apex. Aedeagus robust, enlarged basally; shaft relatively short, directed dorsally and curving anterodorsally; gonopore extending to near base of shaft; anterior incision very short.

REMARKS. The present species is closely related to *antenor* from New Britain but differs in having the shaft of the aedeagus less recurved, the apical process of the style expanded over its distal half and the pygophore processes turned dorsad at their midlength instead of basally. (See additional remarks under *acestes*.)

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Irian Jaya, Waigeu, Camp Nok, 762 m, v.1938 (*L. E. Cheesman*) (BMNH).

Paratypes. **New Guinea**: 2 ♀, same data as holotype (BMNH).



Figs 763–772 763–767, *Batracomorphus antenor*. (763, 764) aedeagus; (765) left pygophore lobe and process, posterior view; (766) pygophore; (767) style. 768–772, *B. orithyia*. (768, 769) aedeagus; (770) style; (771) pygophore; (772) left pygophore lobe and process, ventroposterior view. (For further explanation see 'Techniques and methods'.)

Batracomorphus tereus sp. n.

(Figs 773–777)

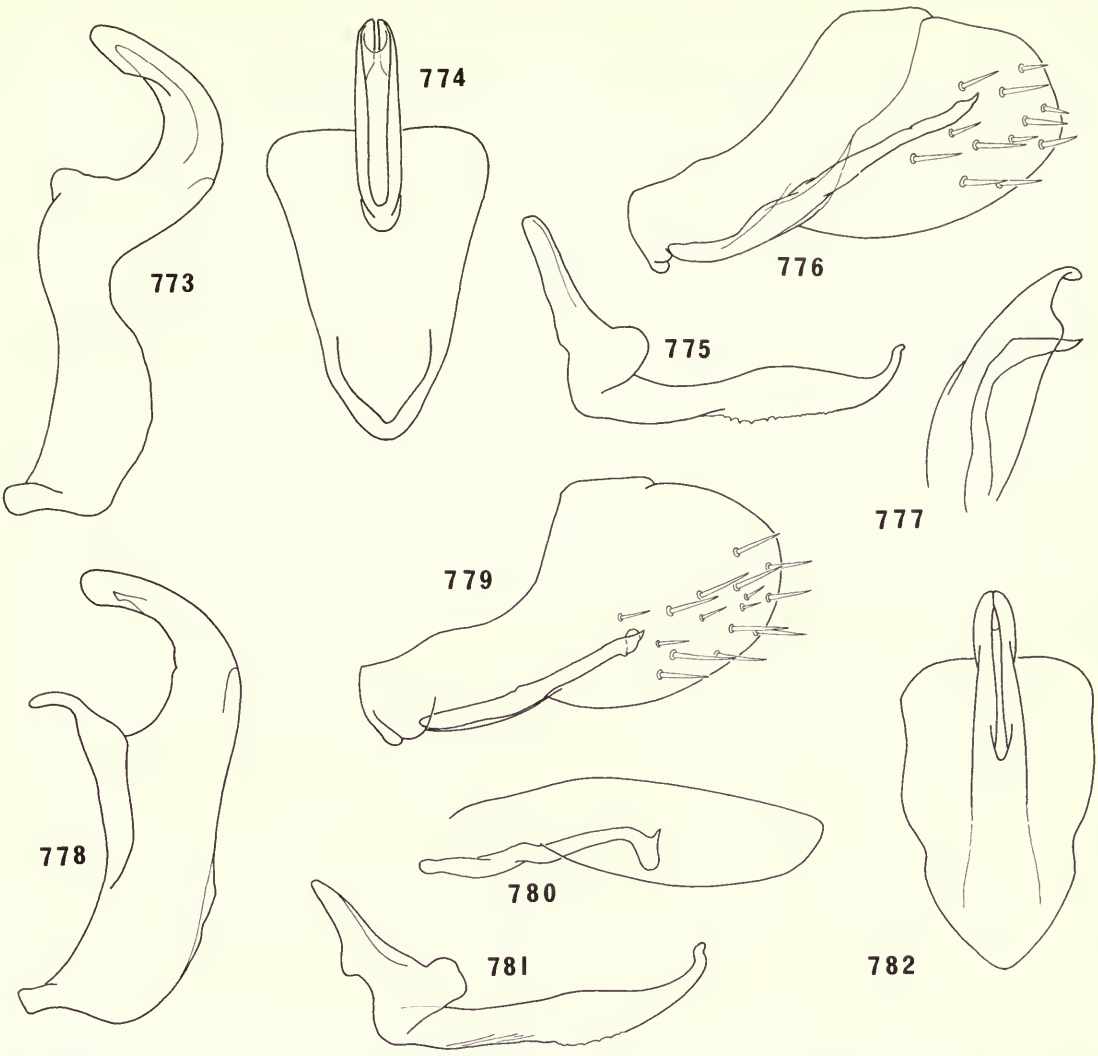
Length: ♂, 4·40–4·88 mm (mean 4·60 mm).

Vertex, pronotum, scutellum and forewings mottled with small dark brown spots.

Vertex flat.

Male genitalia. Pygophore processes slender, directed posteriorly or dorsoposteriorly with apical third turned medially or dorsomesally, apex acute. Subgenital plates as in *acestes*. Styles with apical process elongate, expanded over distal half and tapering to upturned finger-like apex; ventral margin slightly serrate at midlength. Aedeagus robust, base enlarged and strongly concave at junction with shaft; shaft relatively short, directed dorsally and recurved anteriorly; gonopore extending approximately two-thirds length of shaft; anterior incision very short.

Remarks. The present species is mostly closely related to *ufens* from the Solomon Islands but



Figs 773–782 773–777, *Batracomorphus tereus*. (773, 774) aedeagus; (775) style; (776) pygophore; (777) left pygophore lobe and process, ventroposterior view. 778–782, *B. ufens*. (778) aedeagus; (779) pygophore; (780) left pygophore lobe and process, ventral view; (781) style; (782) aedeagus. (For further explanation see 'Techniques and methods'.)

differs in having the pygophore processes relatively longer and acute apically, the posterior margin of the base of the aedeagus strongly concave and the gonopore relatively longer. (See additional remarks under *acestes*.)

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Morobe District, Lae, 10.xii.1964 (*M. E. Bacchus*) (BMNH).

Paratypes. **New Britain**: 1 ♂ (BPBM). **New Guinea**: 1 ♂, Irian Jaya (BMNH).

***Batracomorphus ufens* sp. n.**

(Figs 778–782)

Length: ♂, 4·48–5·28 mm (mean 4·84 mm).

Vertex, pronotum, scutellum and forewings speckled with small dark brown spots.

Vertex flat.

Male genitalia. Pygophore processes short, slender, directed dorsoposteriorly with distal third turned mesally or posteromesally, slightly expanded subapically with a small spur-like projection sometimes present on posterior margin, apex rounded. Subgenital plates as in *acestes*. Styles with apical process elongate, expanded over distal half and tapering to upturned finger-like apex; ventral margin acutely ridged and mildly serrate at midlength. Aedeagus robust, enlarged basally; shaft relatively short, directed dorsally and recurved anteriorly; gonopore extending approximately two-thirds length of shaft; anterior incision very short.

REMARKS. The present species is most closely related to *tereus* from New Guinea and New Britain but lacks the basal concavity on the posterior margin of the aedeagus, has a relatively shorter gonopore and pygophore processes with the apex rounded rather than acute. (See additional remarks under *acestes*.)

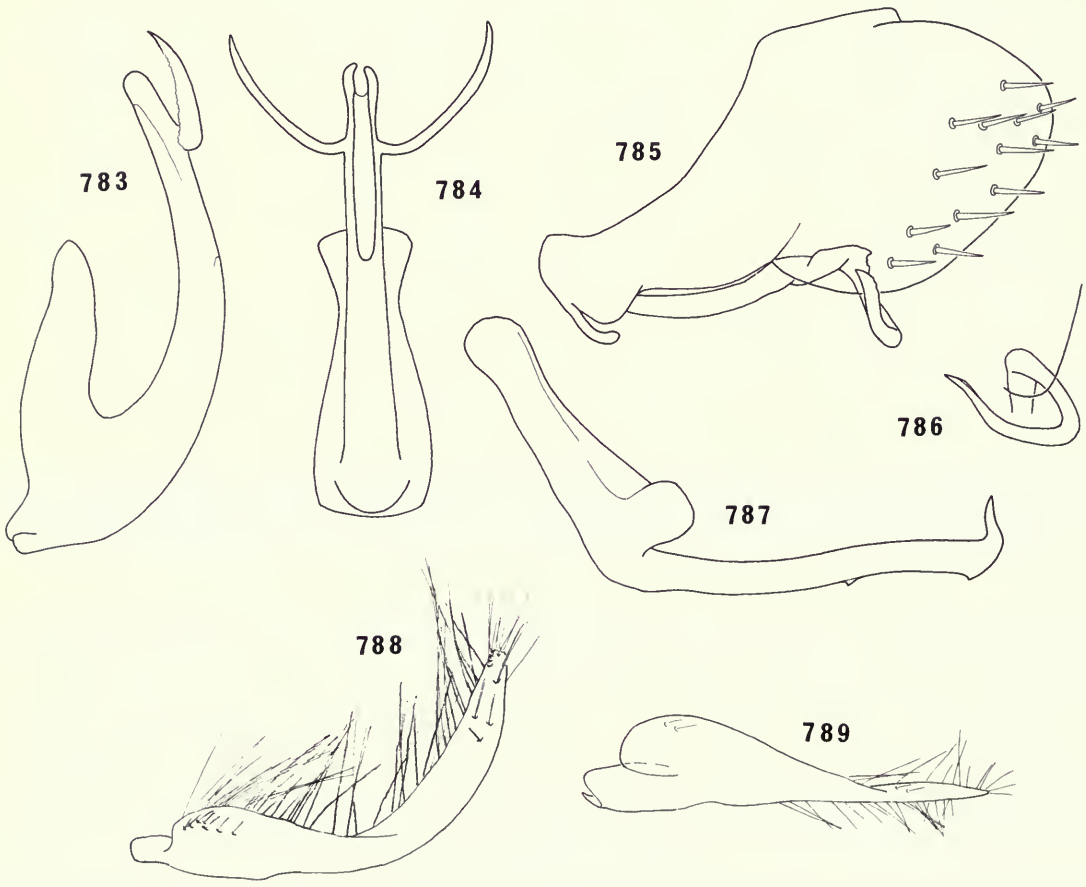
MATERIAL EXAMINED

Holotype ♂, **Solomon Islands**: Kolombangara, 1·6 km inland from Kuzi, Kolombara River, 7.ix.1965 (BMNH).

Paratypes. **Solomon Islands**: 7 ♂, 1 ♀, Bougainville, Guadalcanal, Malaita and Santa Ysabel (BPBM).

Batracomorphus lavinia sp. n.

(Figs 783–789)



Figs 783–789 *Batracomorphus lavinia*. 783, 784, aedeagus; 785, pygophore; 786, left pygophore lobe and process, dorsoposterior view; 787, style; 788, left subgenital plate, left lateral view; 789, same, ventral view. (For further explanation see 'Techniques and methods'.)

Length: ♂, 6·64 mm.
Forewings faintly speckled with small dark brown spots.
Vertex flat.
Male genitalia. Pygophore processes elongate, slender, turned abruptly ventrally at base to near midlength then abruptly laterally and immediately dorsally, apex acute. Subgenital plates normal in shape, as in *harpago*, but basal stem short, ventral marginal row of setae absent and dorsal row multiseriate. Styles with apical process elongate, slender, of uniform width, tapering subapically to acute upturned apex; ventral margin with a small thorn-like projection just distad of midlength and another subapically. Aedeagus slender; shaft directed dorsally and curving slightly anterodorsally; a pair of elongate, subapical processes on posterolateral margins curving laterally and then dorsally; gonopore extending to near midlength of shaft; anterior incision very short.

Remarks. The present species is one of a group of eight (*lavinia, sabinus, menelaus, othrys, pallas, zeus, diomedè* and *samii*) which are characterised by having the vertex flattened, the subgenital plates devoid of hair-like setae on the ventral margin and with the basal stem short, the aedeagus with a pair of apical or subapical processes and a short anterior incision, the apical process of the style slender and elongate with an acute upturned apex, and slender, variously contorted pygophore processes. The species in this group, which extends from Borneo to New Guinea and Australia, resemble *rhesus* from the Philippines in the shape of the aedeagus and styles but differ in the shape of the vertex and subgenital plates. The present species is most closely related to *sabinus* from New Guinea but differs in the relative length and curvature of the shaft of the aedeagus, the more basally situated and laterally directed processes on the shaft, and the more ventrally directed pygophore processes.

Material examined
Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

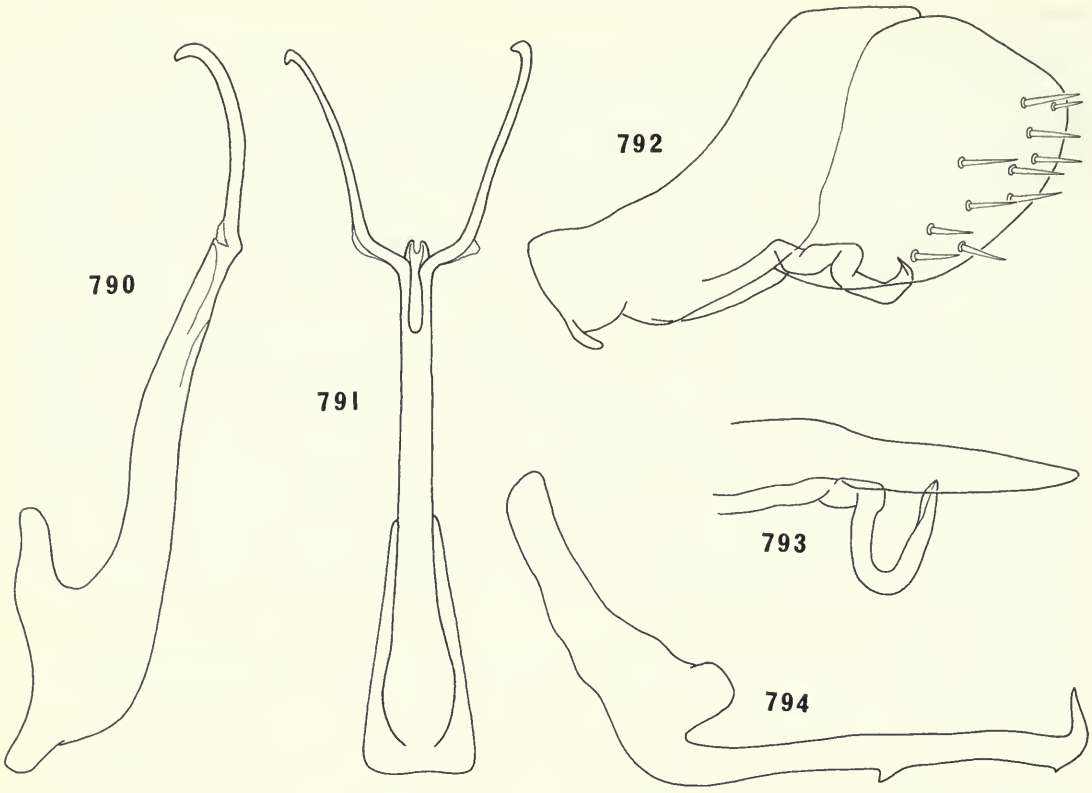
Batracomorphus sabinus sp. n.

(Figs 790–794)

Length: ♂, 6·56–7·20 mm (mean 6·88 mm).
Pronotum and forewings mottled with small variably sized dark brown spots.
Vertex flat; forewings with additional costal cross veins adjacent to outer subapical cell.
Male genitalia. Pygophore processes slender, turned abruptly medially at base to near midlength then abruptly laterally, apex acute with small lamellate expansion subapically on anterior margin. Subgenital plates as in *lavinia*. Styles with apical process elongate, slender, of uniform width, tapering subapically to acute upturned apex; ventral margin with a thorn-like projection at midlength and a much smaller one subapically. Aedeagus slender; shaft elongate, directed dorsally and curving slightly dorsoposteriorly; a pair of slender processes subapically, directed laterally at base and then immediately dorsally, each with a small lamellate expansion laterally at their base; gonopore extending approximately one-fifth length of shaft; anterior incision very small.

Remarks. The present species is most closely related to *lavinia* from New Guinea but differs in having a relatively longer and posteriorly curving shaft to the aedeagus with the processes more apical and directed more dorsad. They also differ in the curvature of the pygophore processes which occurs in a horizontal plane in *sabinus* and a vertical plane in *lavinia*. (See additional remarks under *lavinia*.)

Material examined
Holotype ♂, **New Guinea**: Irian Jaya, Cyclops Mts, Mt Lina, 1067–1372 m, iii.1936 (*L. E. Cheesman*) (BMNH).
Paratype. **New Guinea**: 1 ♂, Waigeu (BMNH).



Figs 790–794 *Batracomorphus sabinus*. 790, 791, aedeagus; 792, pygophore; 793, left pygophore lobe and process, ventral view; 794, style. (For further explanation see 'Techniques and methods'.)

Batracomorphus menelaus sp. n.

(Figs 795–799)

Length: ♂, 6·56–6·64 mm (mean 6·60 mm).

Pronotum and forewings speckled with small dark brown spots, indistinct on forewings.

Vertex flat.

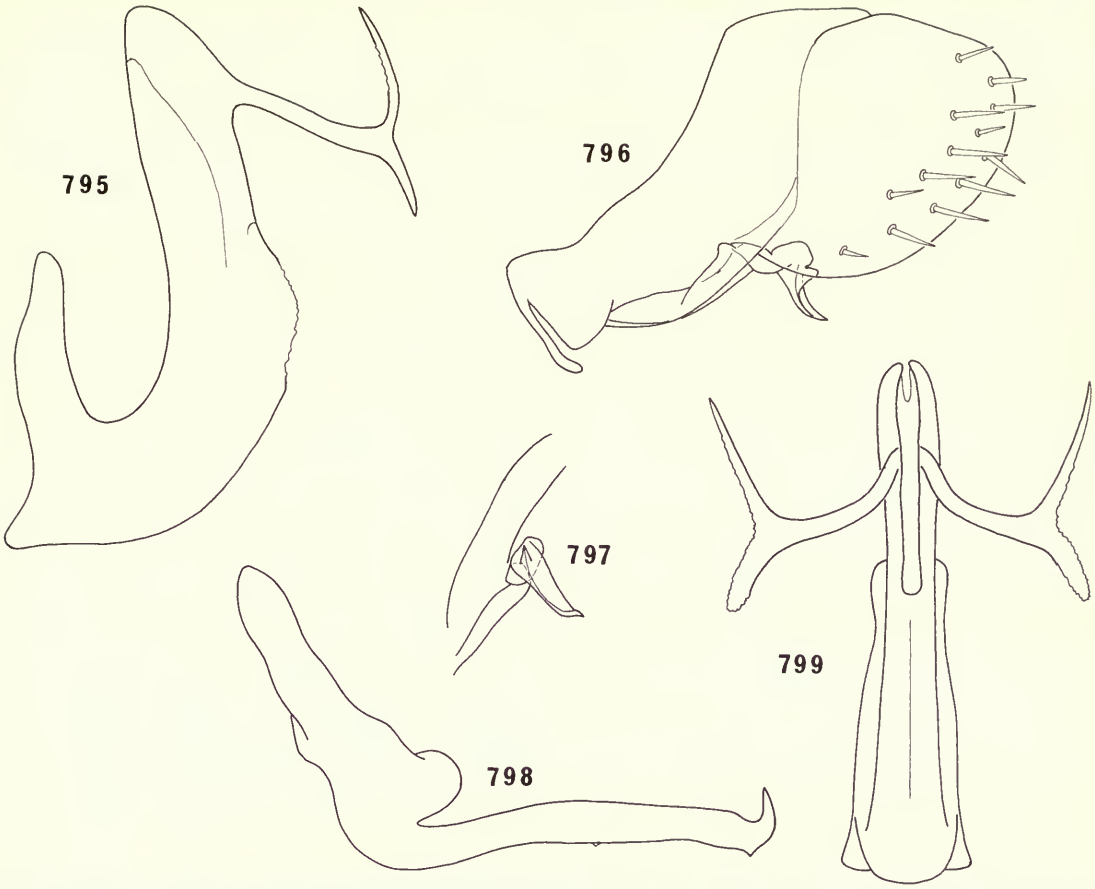
Male genitalia. Pygophore processes short, robust, dagger-like, directed ventromedially, apex acute. Subgenital plates as in *lavinia*. Styles with apical process elongate, slender, of uniform width, tapering subapically to acute upturned apex; ventral margin with a very small thorn-like projection at midlength and another subapically. Aedeagus with shaft broad in lateral aspect, directed dorsally, apex rounded, posterior margin acuminate medially over basal half; a pair of slender divergent processes subapically on posterior margin, directed posteroventrally with apices bifurcate, one branch directed dorsally and other ventrally; gonopore extending to near midlength of shaft; anterior incision short.

Remarks. The present species is most closely related to *lavinia, pallas* and *diomede* but differs from all three in having a broad shaft to the aedeagus, the subapical processes of the aedeagus bifurcate and the pygophore processes robust and dagger-like. (See additional remarks under *lavinia*.)

Material examined

Holotype ♂, **New Guinea**: Papua New Guinea, Mafulu, 1220 m, i.1934 (*L. E. Cheesman*) (BMNH).

Paratypes. **New Guinea**: 1 ♂, 1 ♀, same data as holotype (BMNH).



Figs 795–799 *Batracomorphus menelaus*. 795, aedeagus; 796, pygophore; 797, left pygophore lobe and process, posterior view; 798, style; 799, aedeagus. (For further explanation see 'Techniques and methods'.)

Batracomorphus othrys sp. n.

(Figs 800–804)

Length: ♂, 5·44 mm.

Vertex, pronotum, scutellum and forewings mottled with dark brown.

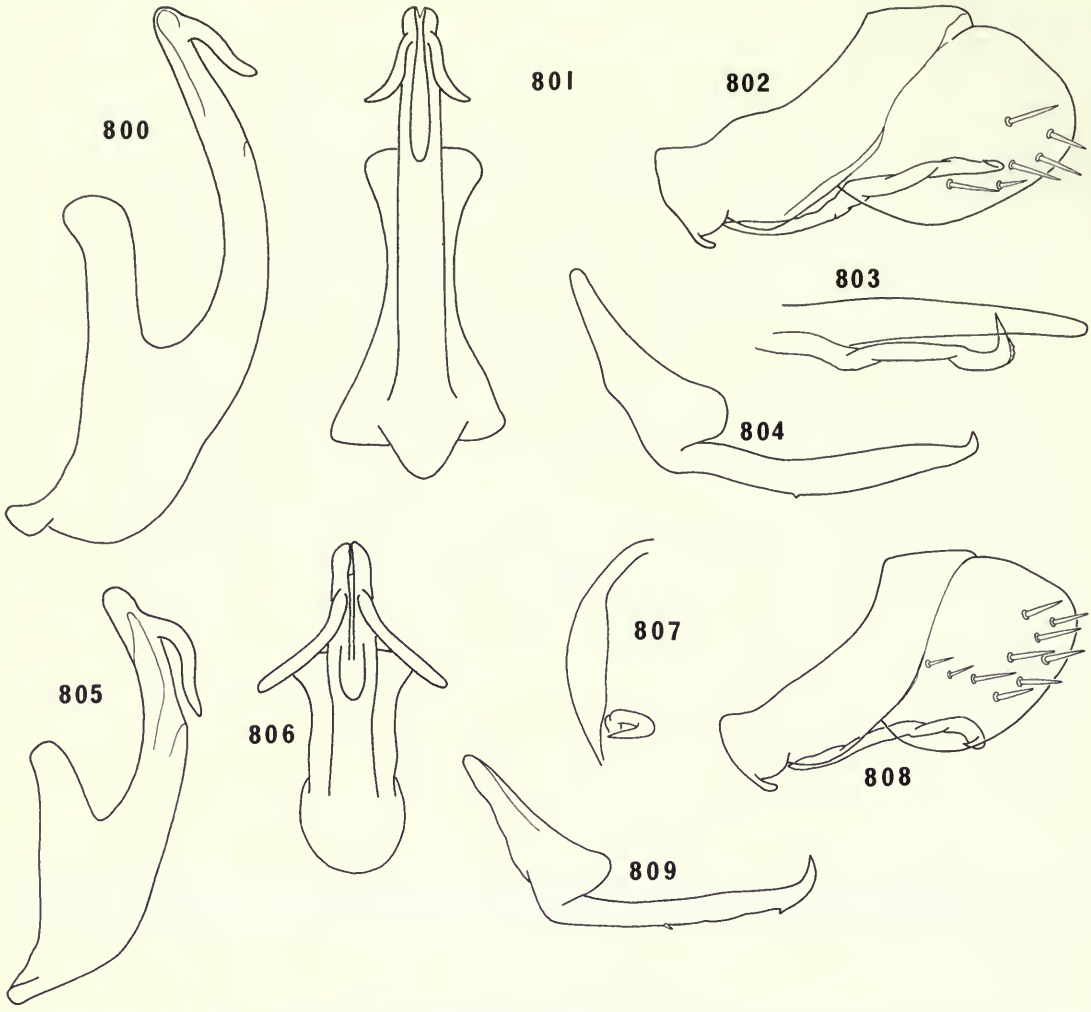
Vertex flat; forewings with additional costal cross veins adjacent to outer subapical cell.

Male genitalia. Pygophore processes slender, directed posteriorly, apex acute and turned abruptly laterally with posterior margin acutely ridged. Subgenital plates as in *lavinia*. Styles with apical process elongate, slender, of approximately uniform width, tapering distally to acute upturned apex, ventral margin with a very small thorn-like projection near midlength. Aedeagus with shaft slender, directed dorsally and curving anterodorsally; a pair of short, ventrally directed, divergent processes subapically on posterior margin; gonopore extending approximately one-third length of shaft; anterior incision very small.

Remarks. The present species is similar to *pallas* from Australia and *zeus* from New Guinea, New Britain and Borneo but differs from both in the orientation of the pygophore processes and the absence of a subapical projection on the ventral margin of the style. It differs from *pallas* also in the relative length of the subapical processes on the aedeagus. (See additional remarks under *lavinia*.)

Material examined

Holotype ♂, **New Guinea**: Papua New Guinea (*J. B. Jackson*) (BMNH).



Figs 800–809 800–804, *Batracomorphus othrys*. (800, 801) aedeagus; (802) pygophore; (803) left pygophore lobe and process, ventral view; (804) style. 805–809, *B. pallas*. (805, 806) aedeagus; (807) left pygophore lobe and process, posterior view; (808) pygophore; (809) style. (For further explanation see 'Techniques and methods'.)

Batracomorphus pallas sp. n.

(Figs 805–809)

Length: ♂, 4·64 mm.

Pronotum, scutellum and forewings speckled with small variably sized, dark brown spots.

Vertex flat.

Male genitalia. Pygophore processes slender, directed posteriorly to near midlength then turned abruptly mesally then laterally, apex acute. Subgenital plates as in *lavinia*. Styles with apical process elongate, slender, of approximately uniform width, tapering distally to acute upturned apex; ventral margin with a small spine subapically and another, sometimes present, just basad of midlength. Aedeagus with shaft slender, directed dorsally and curving anterodorsally; a pair of slender, ventrally directed, divergent processes subapically on posterior margin, extending to lower margin of gonopore; gonopore extending to midlength of shaft; anterior incision short.

Remarks. The present species is similar to *zeus* from Borneo, New Guinea and New Britain and

diomede from Borneo but differs from *zeus* in having the processes of the aedeagus relatively longer and more closely apposed to the shaft in lateral aspect, and from *diomede* in size and in having the apex of the pygophore processes directed laterally rather than dorsally. (See additional remarks under *lavinia*.)

MATERIAL EXAMINED

Holotype ♂, **Australia**: Queensland, Cairns, viii.1904 (BPBM, Type No. 12,567).

Paratype. **Australia**: 1 ♂, same data as holotype (BPBM).

Batracomorphus zeus sp. n.

(Figs 810–817)

Length: ♂, 4·80–5·12 mm (mean 4·92 mm).

Pronotum, scutellum and forewings speckled with small variably sized dark brown spots.

Vertex slightly flattened.

Male genitalia. Pygophore processes short, slender, directed posteriorly to near midlength then turned abruptly either ventrally then dorsally, mesally then laterally or dorsally then ventrally, apex acute. Subgenital plates as in *lavinia* but with basal stem expanded laterally to lateral margin of lobe. Styles with apical process elongate, slender, distal half slightly narrower than basal, tapering distally to acute upturned apex; ventral margin with a small thorn-like projection near midlength and a much larger one subapically. Aedeagus with shaft slender, directed dorsally and curving slightly anterodorsally; a pair of ventrally directed, divergent processes subapically on posterior margin, branched or unbranched; gonopore extending to just distad of midlength; anterior incision short.

REMARKS. The present species is similar to *pallas* from Australia and *diomede* from Borneo but differs from both in having the processes on the aedeagus relatively shorter and less closely apposed to the shaft in lateral aspect. It differs from *diomede* also in size. The variability in the orientation of the apex of the pygophore processes, which can sometimes exist between the two sides of the body, reduces the value of this character for distinguishing between *zeus* and *pallas*. (See additional remarks under *lavinia*.)

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

Paratypes. **Borneo**: 6 ♂, Sabah (BPBM). **New Britain**: 4 ♂ (BPBM). **New Guinea**: 2 ♂, Irian Jaya and Papua New Guinea (BMNH).

Batracomorphus diomede sp. n.

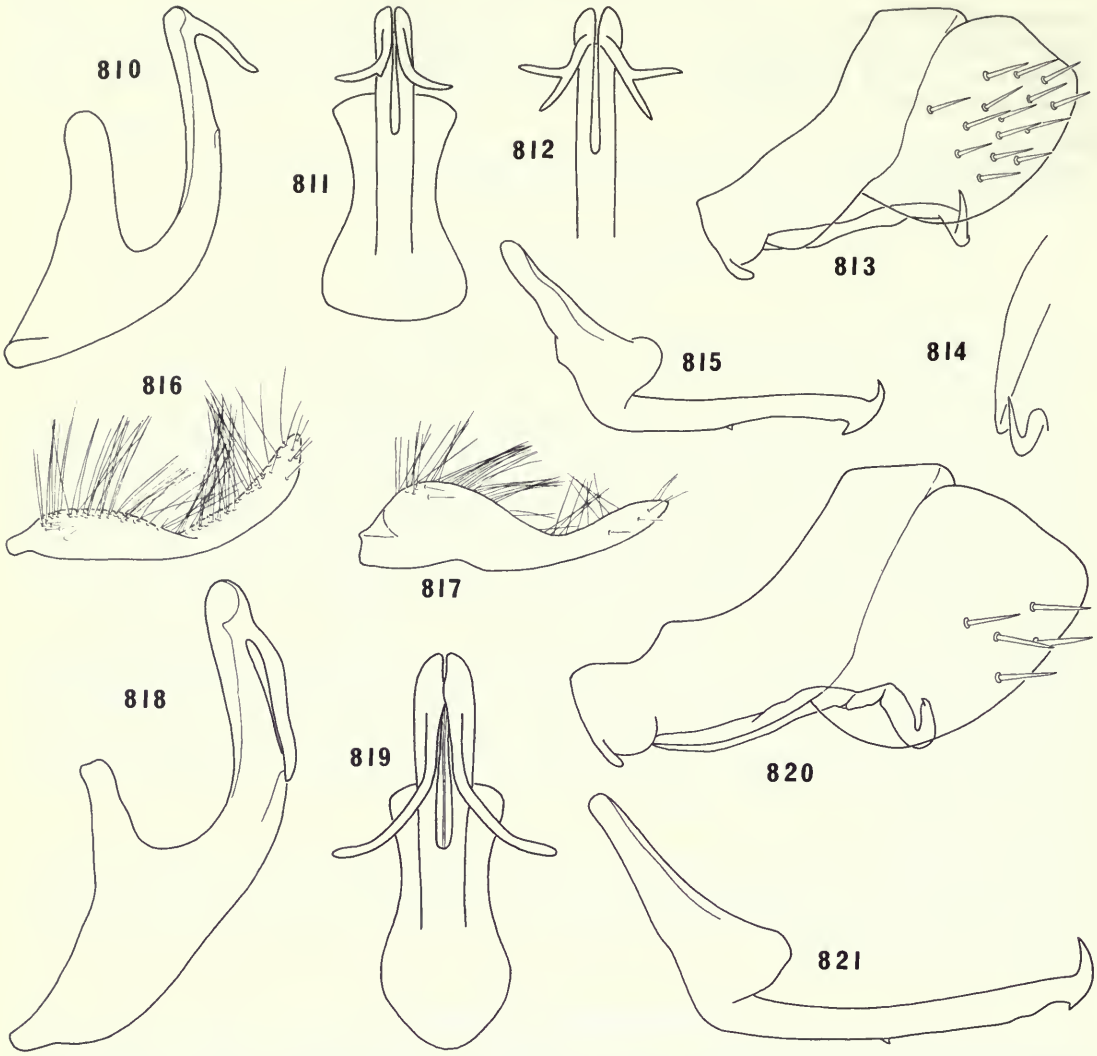
(Figs 818–821)

Length: ♂, 5·92–6·88 mm (mean 6·40 mm).

Pronotum, scutellum and forewings speckled with small variably sized dark brown spots.

Male genitalia. Pygophore processes short, slender, directed posteriorly to near midlength then turned abruptly ventrally then dorsally, apex acute. Subgenital plates as in *lavinia*. Styles with apical process elongate, slender, of uniform width, tapering distally to acute upturned apex; ventral margin with a small thorn-like projection near midlength and another subapically. Aedeagus with shaft slender, directed dorsally and curving slightly anterodorsally; a pair of ventrally directed, divergent processes subapically on posterior margin extending to just basad of midlength of shaft; gonopore extending to just basad of midlength of shaft; anterior incision short.

REMARKS. The present species is one of a group of eight characterised by the shape of the vertex and male genitalia, as described under *lavinia*. It differs from all others in the group by not having the vertex flattened but is clearly related in all other respects. It is closely related to *pallas* from Australia and *zeus* from New Guinea, New Britain and Borneo but is much larger than either of these as well as differing in the shape of the vertex. It also differs from *pallas* in having the apex of the pygophore processes directed dorsally rather than laterally, and from *zeus* in having the subapical processes of the aedeagus relatively longer and more closely applied to the shaft.



Figs 810–821 810–817, *Batracomorphus zeus*. (810, 811) aedeagus; (812) aedeagus, same population; (813) pygophore; (814) left pygophore lobe and process, posterior view; (815) style; (816) left subgenital plate, left lateral view; (817) same, ventral view. 818–821, *B. diomede*. (818, 819) aedeagus; (820) pygophore; (821) style. (For further explanation see 'Techniques and methods'.)

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sarawak, Mt Dulit, 1220 m, moss forest, 28.x.1932 (*B. M. Hobby & A. W. Moore*) (BMNH).

Paratype. **Borneo**: 1 ♂, Sabah (BPBM).

Batracomorphus samii Evans

(Figs 822–825)

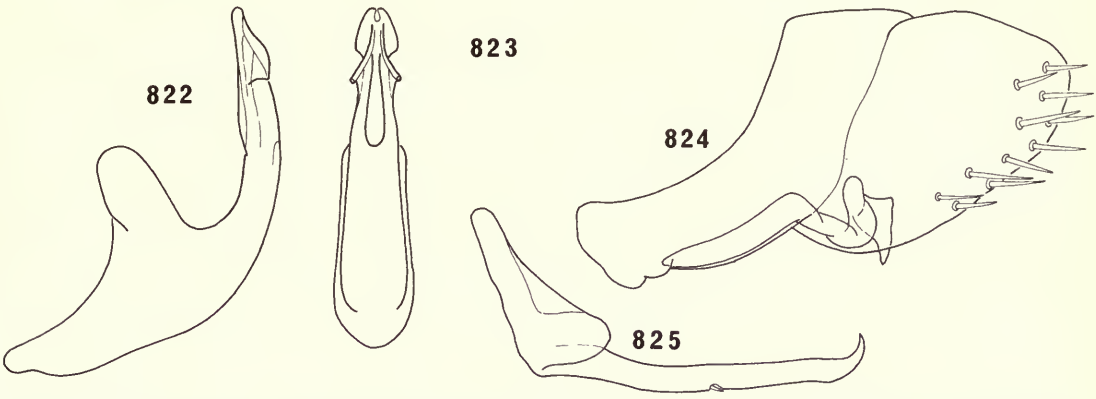
Batrachomorphus samii Evans, 1972: 655. Holotype ♂, AUSTRALIA (AM) [examined].

Length: ♂, 5·25 mm.

Vertex and forewings speckled with small variably shaped and sized dark brown spots.

Vertex flattened and with slight ridge round anterior margin; forewing venation normal with 1–2 additional cross veins on costal margin adjacent to outer subapical cell.

Male genitalia. Pygophore processes short, robust, directed posteriorly at base then turned abruptly dorsally with a posteriorly directed, lamellate, foot-shaped expansion subapically on posterior margin. Subgenital plates as in *lavinia*. Styles with apical process elongate, slender, of uniform width, tapering distally to acute upturned apex; ventral margin with a small spine at midlength. Aedeagus with shaft slender, directed dorsally; a pair of posteriorly directed lamellate expansions subapically on lateral margin and another laterally directed pair apically; gonopore extending to near midlength of shaft; anterior incision very short.



Figs 822–825 *Batracomorphus samii* (holotype). 822, 823, aedeagus; 824, pygophore; 825, style. (For further explanation see 'Techniques and methods'.)

REMARKS. The present species is one of a group of eight characterised by the shape of the vertex and male genitalia, as described under *lavinia*. It differs from all others in the group by having lamellate expansions rather than processes at the apex of the aedeagus but is clearly related to them in all other respects. In addition to the absence of processes on the aedeagus it differs from all other species in the group by the shape of the pygophore processes.

DISTRIBUTION. Australia.

MATERIAL EXAMINED

Batrachomorphus samii Evans, holotype ♂, **Australia**: N. Queensland, Cairns, L. T., xi.1969 (*J. Brooks*) (AM).

Batracomorphus cycnus sp. n.

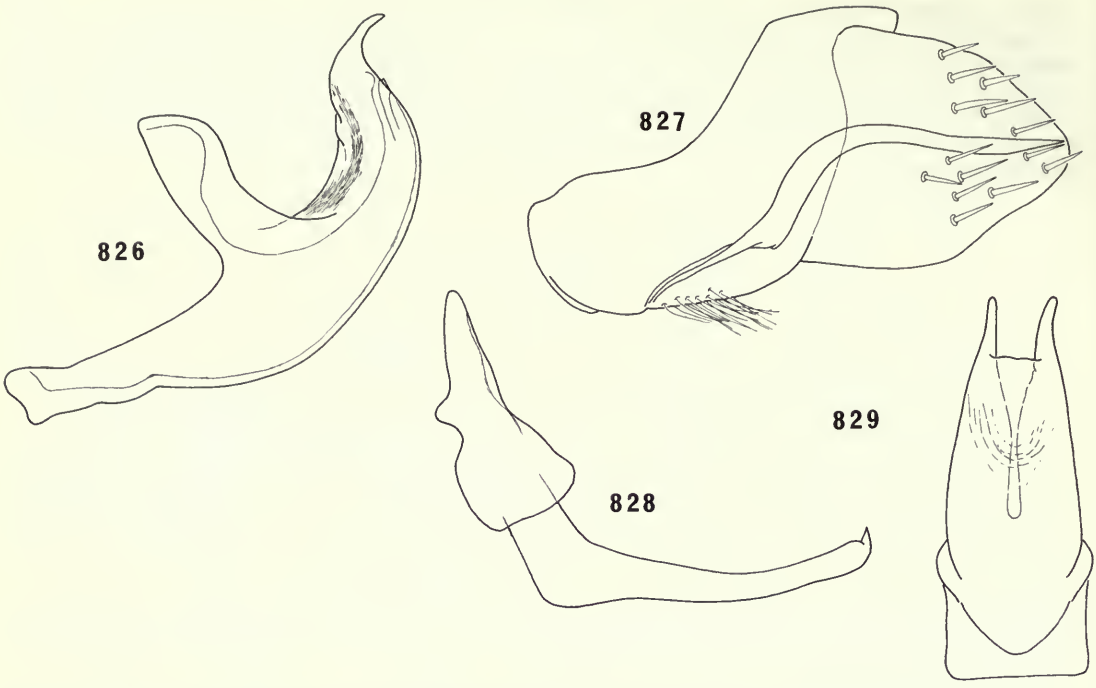
(Figs 826–829)

Length: ♂, 7·28 mm.

Vertex flattened; forewings with additional cross veins on costal margin adjacent to outer subapical cell.

Male genitalia. Pygophore with a group of short hair-like setae basally on ventral margin; processes long, slender, directed dorsally at base then curving posteriorly, apex acute. Subgenital plates as in *zeus* with basal stem expanded laterally to lateral margin of lobe; two multiseriate rows of hair-like setae dorsally from base to apex, one against lateral margin and other against mesal margin, combining apically and extending round apex onto apical region of ventral margin. Styles with apical process broad and distinctly elbowed at base, narrowing to slender, parallel-sided distal half, abruptly tapered distally to acute upturned apex; basal lobe directed laterally. Aedeagus robust; shaft short, broad, directed dorsally with lateral margins extending distally as pair of short, dorsoposteriorly directed horn-like projections; gonopore apical; anterior incision extending to base of shaft.

REMARKS. This species is similar to those of the previous two groups in having the vertex flattened, the subgenital plates devoid of setae on the ventral margin and the basal stem short and the apical process of the style long and slender. It differs from both groups, however, in the shape of the aedeagus with its apical gonopore, the shape of the pygophore processes and in the unique possession of a group of hair-like setae on the ventral basal margin of the pygophore. The



Figs 826–829 *Batracomorphus cycnus*. 826, aedeagus; 827, pygophore; 828, style; 829, aedeagus. (For further explanation see 'Techniques and methods'.)

genitalia show superficial similarity to those of *daedalus* from Sulawesi in the shape of the aedeagus and pygophore processes, but the two species show basic differences in the shape of the subgenital plates and styles as well as differing in the aedeagus, pygophore and in size.

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Luzon, Benguet Province, Baguio (*Baker*) (USNM).

***Batracomorphus iulus* sp. n.**

(Figs 830–833)

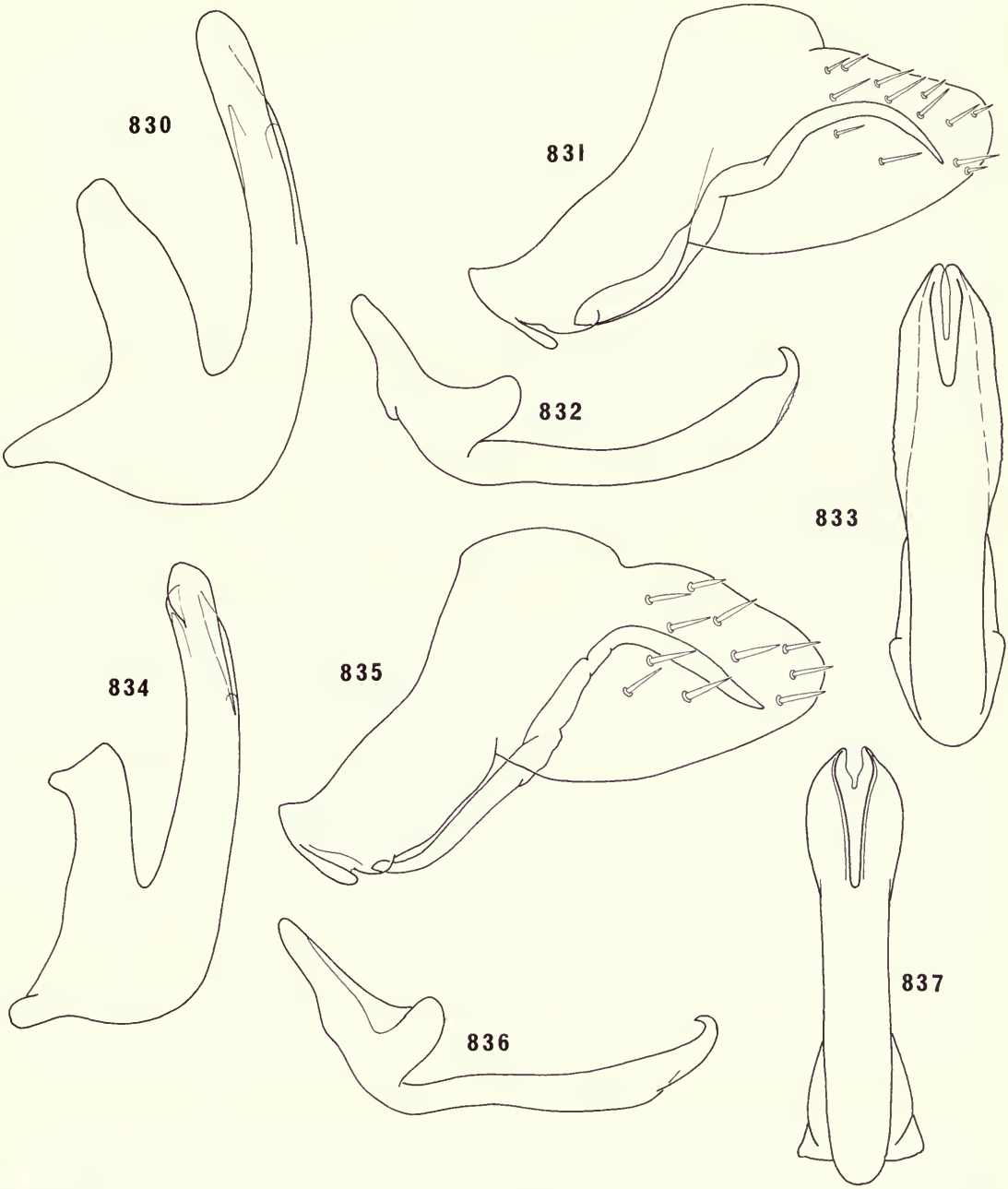
Length: ♂, 6·32 mm.

Vertex flattened.

Male genitalia. Pygophore processes elongate, slender, directed posteriorly at base then abruptly arched dorsally, apex acute and directed posteroventrally. Subgenital plates as in *harpago* but without dorsal setae except for basal group. Styles with apical process elongate, slender, expanding towards apex over distal half, abruptly narrowed subapically to acute upturned apex. Aedeagus with shaft slender, directed dorsally, a lamellate expansion on each posterolateral margin of shaft over distal half; gonopore extending approximately one-fourth length of shaft; anterior incision approximately two-thirds length of gonopore.

REMARKS. This species is one of a group of seven (*iulus, anchises, alcides, palinurus, vesta, janus* and *eumenides*) which are characterised by having the vertex flattened, the subgenital plates devoid of dorsal setae except for the basal group, the pygophore processes elongate and strongly arched dorsally, the apical process of the style elongate and expanding towards the apex over the distal half, and the aedeagus with lamellate expansions distally on the shaft. The aedeagus is either slender or robust, the latter form having the gonopore relatively short and the anterior incision both short and wide. The species in this group, which occurs in the Philippines, West Malaysia and the western half of Indonesia, show no strong relationship to the main group of species which have normal subgenital plates, although there is a slight resemblance to *peteos* and *troilus* of Borneo which have a slender aedeagus and to *daedalus* of Sulawesi which has a robust

aedeagus and dorsally arched pygophore processes. The present group differs from all three, however, in all other characters. Within the present group, *iulus* is most closely related to *anchises* from the Philippines, Borneo and West Malaysia but is larger and differs in having the anterior incision of the aedeagus relatively longer, the posterolateral expansions on the shaft extending more basad, and the basal portion of the pygophore process directed posteriorly rather than dorsally.



Figs 830–837 830–833, *Batracomorphus iulus*. (830) aedeagus; (831) pygophore; (832) style; (833) aedeagus. 834–837, *B. anchises*. (834) aedeagus; (835) pygophore; (836) style; (837) aedeagus. (For further explanation see 'Techniques and methods'.)

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Mindanao, Misamis Or., Mt, Balatukan, 15 km SW. of Gingoog, 1000–2000 m, 1–5.v.1960 (*H. Torrevillas*) (BPBM, Type No. 12,568).

Batracomorphus anchises sp. n.

(Figs 834–837)

Length: ♂, 4·56–5·28 mm (mean 4·95 mm).

Vertex flat.

Male genitalia. Pygophore processes elongate, slender, directed dorsoposteriorly over basal half then ventroposteriorly, apex acute. Subgenital plates as in *iulus*. Styles with apical process elongate, slender, expanded just distad of midlength then gradually tapered to acute upturned apex. Aedeagus with shaft slender, directed dorsally, lateral margins expanded keel-like over distal third; gonopore extending approximately one-third length of shaft; anterior incision short, relatively wide (as illustrated) or narrow and more slit-like.

REMARKS. The present species is most closely related to *iulus* from the Philippines but is smaller, has the anterior incision of the aedeagus relatively shorter and the apical keel-like expansions less extensive, the apical process of the style more gradually tapered distally and the pygophore processes directed dorsoposteriorly rather than posteriorly at the base. (See additional remarks under *iulus*.)

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sabah, 8.vii.1968 (BMNH).

Paratypes. **Borneo**: 9 ♂, Sabah and Sarawak (BPBM). **Philippines**: 16 ♂, 2 ♀, Busuanga, Culion, Luzon, Mindanao, Palawan and Tawi Tawi (BPBM, FMNH, ZM). **West Malaysia**: 1 ♂ (BMNH).

Batracomorphus alcides sp. n.

(Figs 838–841)

Length: ♂, 5·20–5·44 mm (mean 5·29 mm).

Vertex flat.

Male genitalia. Pygophore processes elongate, slender, directed dorsoposteriorly and curving posteroventrally, apex acute. Subgenital plates as in *iulus*. Styles with apical process elongate, slender, expanding towards apex over distal half, abruptly narrowed subapically to acute upturned apex. Aedeagus with shaft slender, directed dorsally, posterolateral margins with long lamellate expansions over midlength and shorter ones subapically; gonopore extending approximately one-third length of shaft; anterior incision short, approximately one-third length of gonopore.

REMARKS. The present species is most closely related to *iulus* from the Philippines and *anchises* from the Philippines, Borneo and West Malaysia but differs from both in having a more elongate shaft to the aedeagus, with lamellate expansions at its midlength as well as apically, and the apical process of the style more abruptly narrowed subapically. (See additional remarks under *iulus*.) It is known only from the Minahassa region of Sulawesi.

MATERIAL EXAMINED

Holotype ♂, **Sulawesi**: Minhassa, vii.1954 (*A. H. G. Alston*) (BMNH).

Paratypes. **Sulawesi**: 3 ♂ (BMNH).

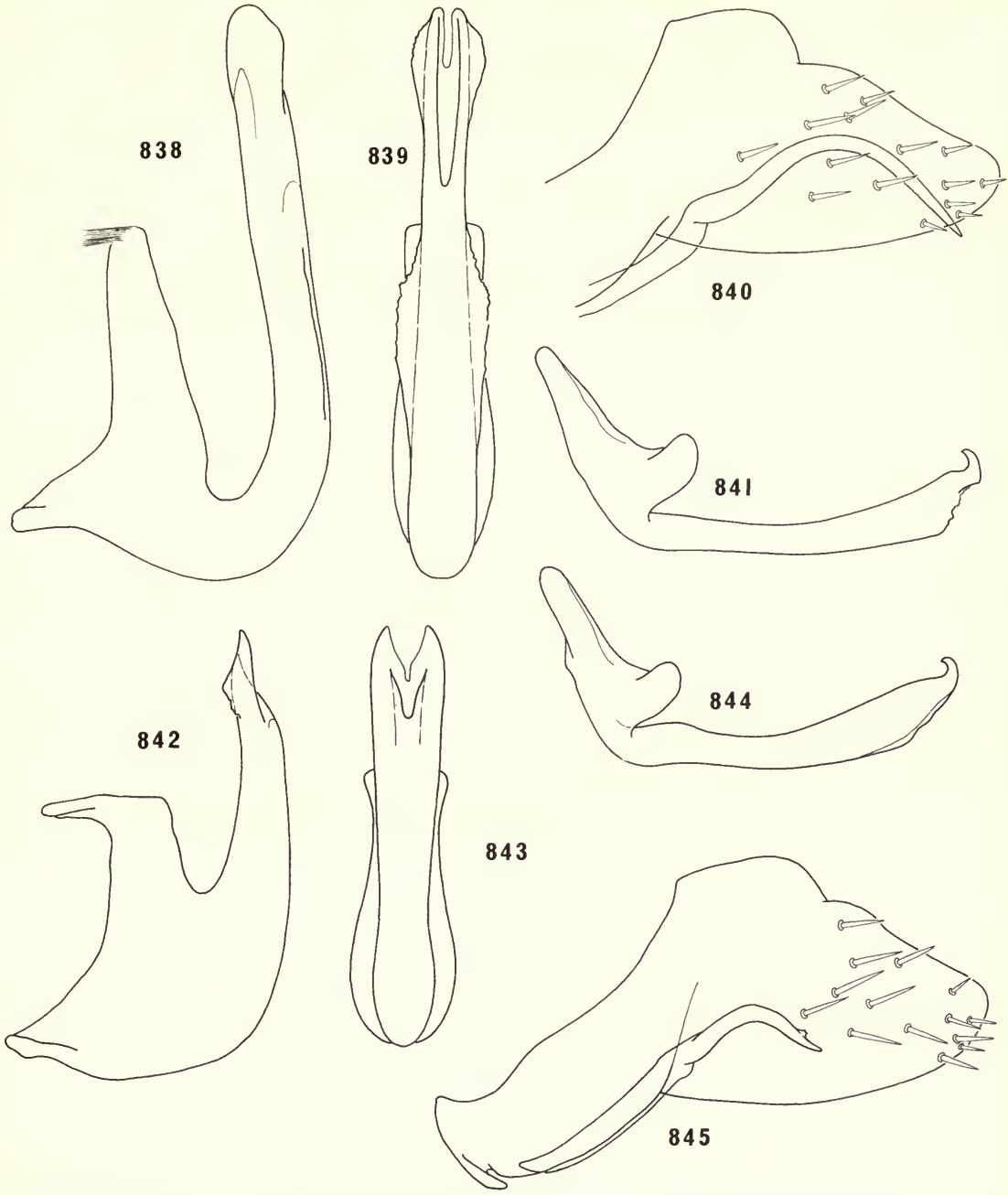
Batracomorphus palinurus sp. n.

(Figs 842–845)

Length: ♂, 4·56–5·28 mm (mean 5·00 mm).

Vertex flat.

Male genitalia. Pygophore processes slender, relatively short (as illustrated) or long (as in *vesta*), directed dorsoposteriorly over basal half then ventroposteriorly, apex acute, a small tubercle subapically on dorsal margin. Subgenital plates as in *iulus*. Styles with apical process elongate, slender, expanding towards apex over distal half then tapering to acute upturned apex. Aedeagus robust basally; shaft



Figs 838–845 838–841, *Batracomorphus alcides*. (838, 839) aedeagus; (840) pygophore; (841) style. 842–845, *B. palinurus*. (842, 843) aedeagus; (844) style; (845) pygophore. (For further explanation see 'Techniques and methods'.)

relatively short, directed dorsally, tapering distally in lateral aspect, terminating in a pair of lateral, distally acute, lamellate lobes; gonopore short; anterior incision short, broadly V-shaped.

Remarks. The present species varies in the length of the pygophore processes, specimens from Java having the processes short, as illustrated, and the single known specimen from Sarawak having it long as in *vesta*. It is most closely related to *vesta* from Borneo but differs in having the

shaft of the aedeagus tapered apically in lateral aspect and without a marked constriction at its midlength in posterior aspect, and the gonopore not mounted on a short spout. (See additional remarks under *iulus*.)

MATERIAL EXAMINED

Holotype ♂, **Java**: Dampit, Soember Pakel, 1919 (*D. MacGillavry*) (ITZ).

Paratypes. **Java**: 1 ♂, same data as holotype (ITZ). **Borneo**: 1 ♂, Sarawak (BPBM).

Batracomorphus vesta sp. n.

(Figs 846–850)

Length: ♂, 4·80–5·36 mm (mean 4·94 mm).

Vertex flat.

Male genitalia. Pygophore processes elongate, slender, directed dorsoposteriorly and curving ventroposteriorly, apex acute, a small spur rarely present on ventral margin near midlength. Subgenital plates as in *iulus*. Styles with apical process elongate, slender, expanding slightly towards apex over distal half then tapering to acute upturned apex. Aedeagus robust basally; shaft relatively short, directed dorsally, constricted at midlength in posterior aspect, terminating in a pair of lateral, distally acute, lamellate lobes; gonopore short, mounted on short spout; anterior incision short, V-shaped.

REMARKS. The present species is most closely related to *palinurus* from Java and Borneo but differs in having the shaft of the aedeagus constricted at its midlength in posterior aspect and broadly rounded rather than tapered apically in lateral aspect, and the gonopore mounted on a short spout. (See additional remarks under *iulus*.)

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sarawak, foot of Mt Dulit, junction of rivers Tinjar and Lejok, 30.x.1932 (*B. M. Hobby & A. W. Moore*) (BMNH).

Paratypes. **Borneo**: 32 ♂, 2 ♀, Sabah and Sarawak (BMNH, BPBM).

Batracomorphus janus sp. n.

(Figs 851–854).

Length: ♂, 4·96–5·04 mm (mean 5·00 mm).

Vertex flat.

Male genitalia. Pygophore processes elongate, slender, directed dorsoposteriorly and curving ventroposteriorly, apex acute, a short slender spur on ventral margin approximately one-third distance from base. Subgenital plates as in *iulus*. Styles with apical process elongate, slender, expanding slightly towards apex over distal half, then tapering to acute upturned apex. Aedeagus with shaft relatively short, directed dorsally, increasing gradually in width towards apex in posterior aspect and terminating in a pair of lateral, distally acute, lamellate lobes; gonopore short, mounted on short spout; anterior incision short, broadly U-shaped.

REMARKS. The present species is most closely related to *vesta* from Borneo but has more slender pygophore processes with a ventral spur basally, the aedeagus less robust basally and the shaft relatively longer and less constricted at its midlength in posterior aspect, the anterior incision of the shaft much broader and the gonopore much wider distad of the spout. (See additional remarks under *iulus*.) It is known only from the west central area of Malaya.

MATERIAL EXAMINED

Holotype ♂, **West Malaysia**: Kuala Lumpur, 13.ii.1929 (*H. M. Pendlebury*) (BMNH).

Paratype. **West Malaysia**: 1 ♂ (BMNH).

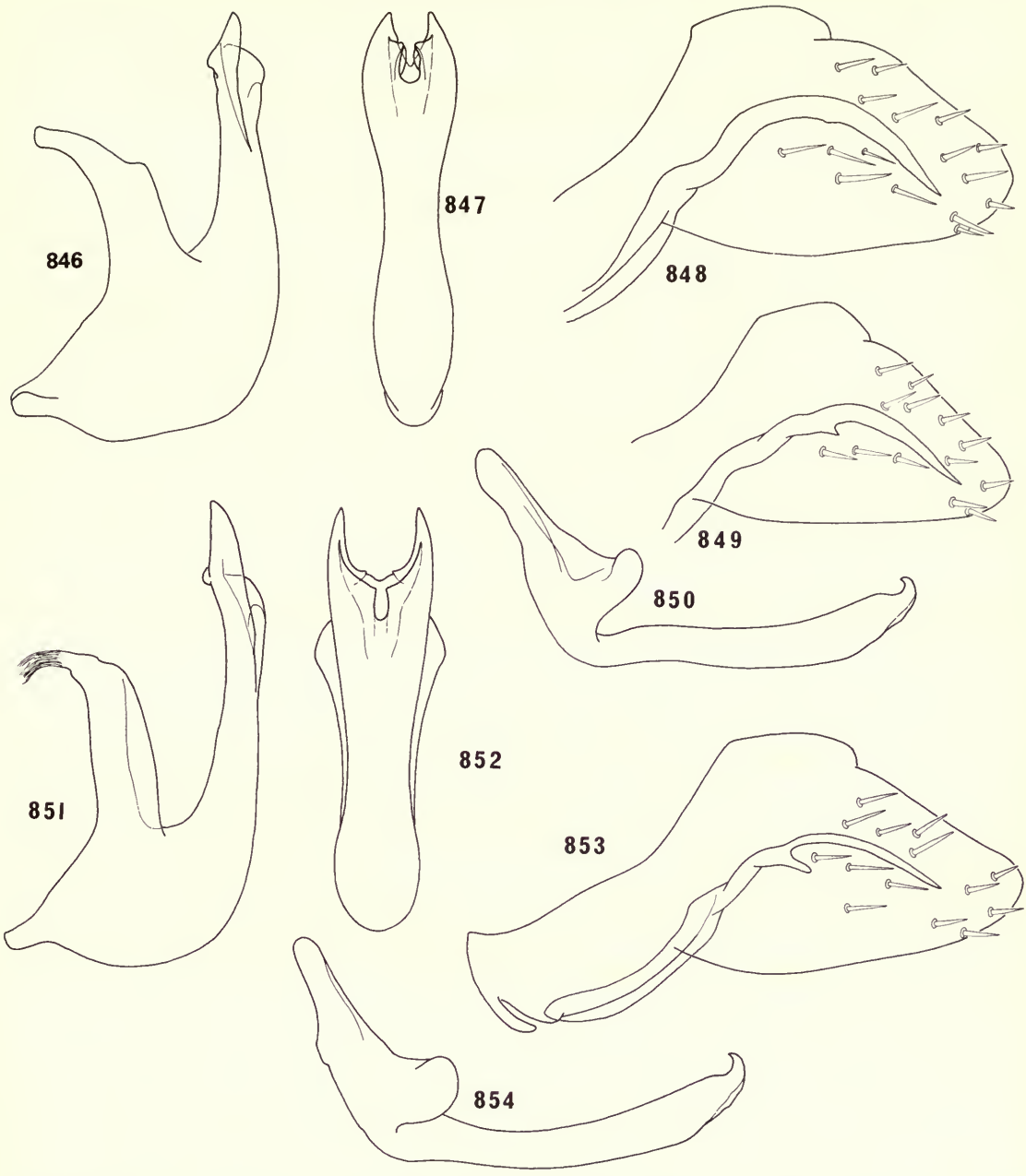
Batracomorphus eumenides sp. n.

(Figs 855–858)

Length: ♂, 4·72 mm.

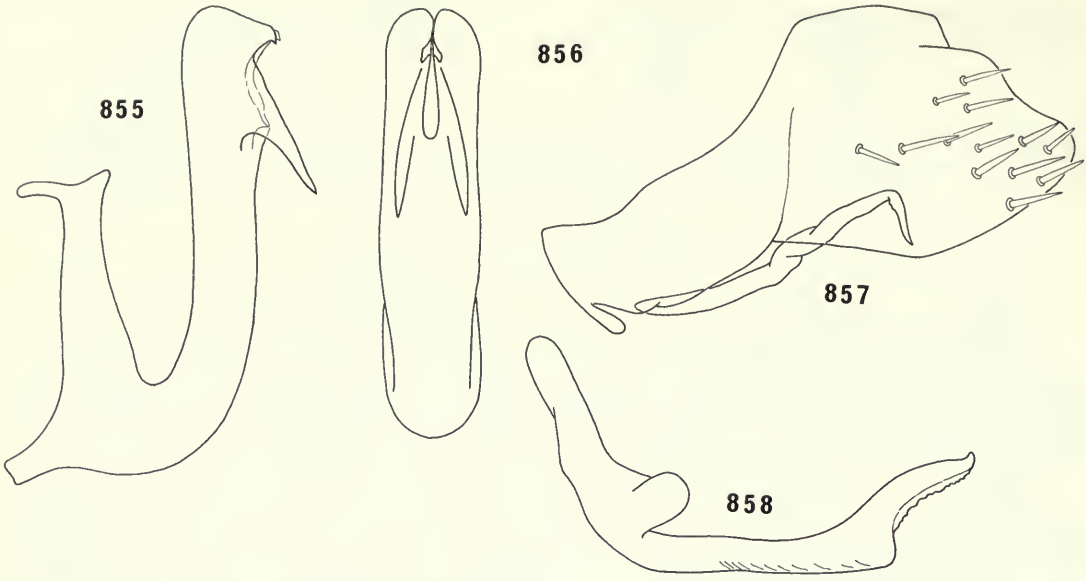
Vertex flat.

Male genitalia. Pygophore processes short, slender, directed posterodorsally to just distad of midlength then turned abruptly ventrally, apex acute. Subgenital plates as in *iulus*. Styles with apical process



Figs 846–854 846–850, *Batracomorphus vesta*. (846, 847) aedeagus; (848) pygophore; (849) pygophore; (850) style. 851–854, *B. janus*. (851, 852) aedeagus; (853) pygophore; (854) style. (For further explanation see 'Techniques and methods'.)

elongate, directed posteriorly over basal two-thirds then turned abruptly dorsoposteriorly and tapering to acute mesally directed apex. Aedeagus with shaft directed dorsally, apex rounded in both lateral and posterior aspect; a pair of posteroventrally directed, triangularly elongate processes on posterior margin near apex, contiguous with a pair of small, broadly triangular, posteriorly directed, subapical, lamellate expansions on posterior margin; gonopore extending approximately one-fourth length of shaft between bases of posterior processes; anterior incision very short.



Figs 855–858 *Batracomorphus eumenides*. 855, 856, aedeagus; 857, pygophore; 858, style. (For further explanation see 'Techniques and methods'.)

Remarks. The present species is one of a group of seven characterised by the shape of the vertex and male genitalia, as described under *iulus*. It differs from the others in the group by the shape of the style and the presence of processes on the aedeagus yet is sufficiently similar in all other respects to suggest a close association. It is known only from the west central area of Malaya.

Material examined

Holotype ♂, **West Malaysia**: Kuala Lumpur, 27.ii.1919 (BMNH).

Paratypes. **West Malaysia**: 1 ♂, 1 ♀ (BMNH).

Batracomorphus nereus sp. n.

(Figs 859–863)

Length: ♂, 4·88–5·28 mm (mean 5·12 mm).

Vertex flat.

Male genitalia. Pygophore processes elongate, slender, directed posteriorly, apex acute and turned dorsoposteriorly, ventral margin acutely ridged and irregularly and narrowly lamellate over distal half, processes sometimes rotated on longitudinal axis so apex turned mesoposteriorly and lateral margin acutely ridged and lamellate, differing sometimes between two sides of pygophore. Subgenital plates as in *harpago* but without setae on dorsal margin except for basal group. Styles with apical process elongate, increasing markedly in width towards apex then abruptly narrowed subapically to acute upturned apex. Aedeagus short, robust, without basal apodeme; shaft short, wide and broadly rounded apically in lateral aspect, laterally compressed, directed dorsally and recurved anterodorsally; gonopore extending approximately one-third length of shaft; anterior incision extending to near midlength of shaft.

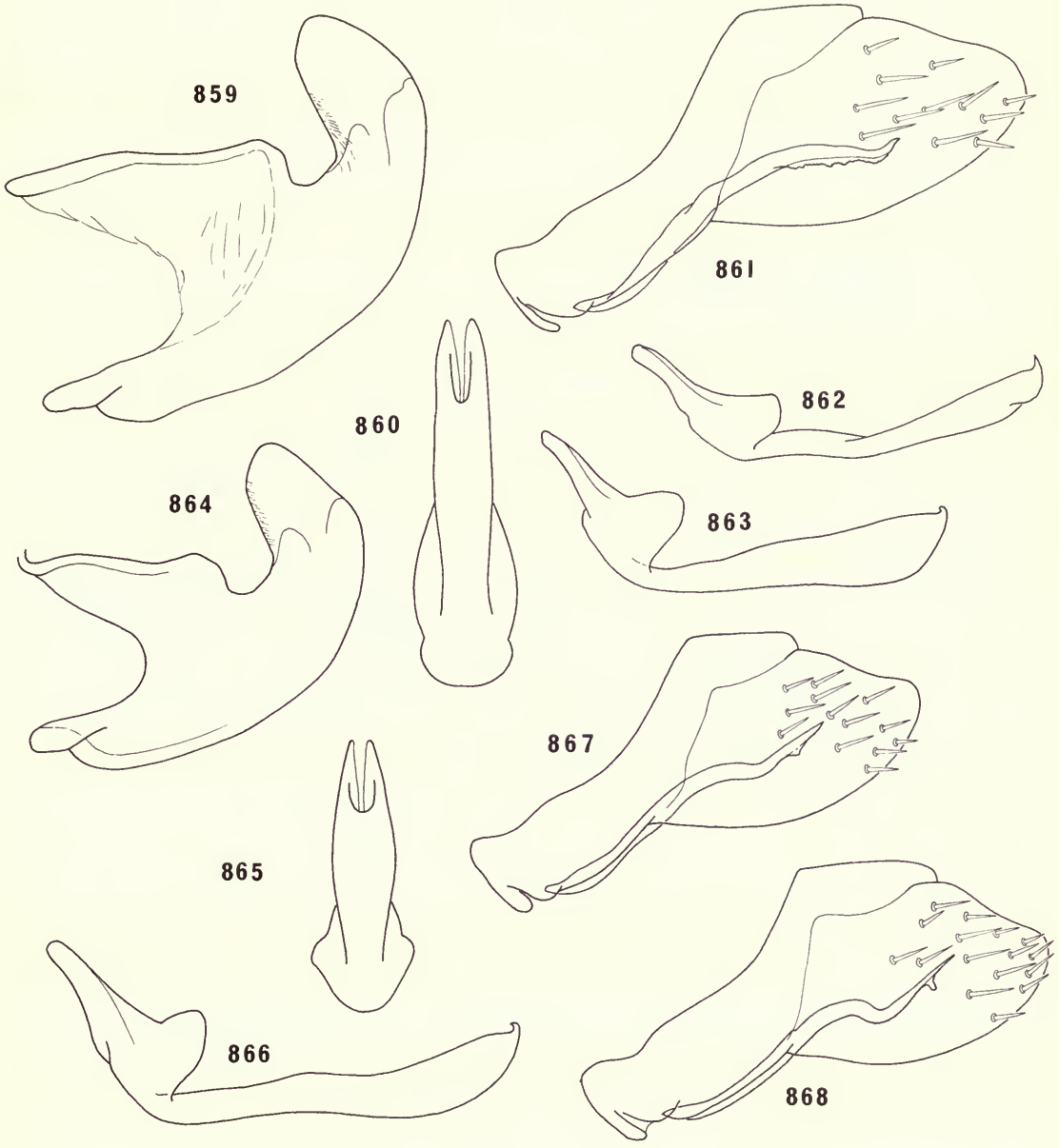
Remarks. This species is one of a group of four (*nereus, tullus, brooksi* and *ogasawarensis*) which are characterised by having the vertex flattened, the subgenital plates as in *harpago* but without the full complement of hair-like setae on the dorsal surface and sometimes also ventral surface, the pygophore processes slender and simple, the aedeagus robust, devoid of a prominent basal apodeme and with the shaft short and recurved anteriorly, and the apical process of the styles increasing markedly in width over its distal half. The species in this group, which occurs in the Philippines, Australia and the Bonin Islands, resemble *lentiginosus, dymas* and *remus* in the shape of the aedeagus although the latter is much more robust in the present group. The apical process of the styles is also more expanded in the present group, the basal stem and lobe of the

subgenital plates more pronounced and the vertex flattened. The present species is most closely related to *tullus* from the Philippines but differs in having the pygophore processes acuminate ventrally over their distal half and turned dorsoposteriorly at their apex rather than midlength.

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Luzon, Mt Makiling (*Baker*) (USNM).

Paratypes. **Philippines**: 23 ♂, 16 ♀, Balabac, Luzon and Negros (AMNH, BPBM, USNM, ZM).



Figs 859–868 859–863, *Batracomorphus nereus*. (859, 860) aedeagus; (861) pygophore; (862) style; (863) same, ventrolateral view. 864–868, *B. tullus*. (864, 865) aedeagus; (866) style; (867) pygophore; (868) pygophore. (For further explanation see 'Techniques and methods'.)

Batracomorphus tullus sp. n.

(Figs 864–868)

Length: ♂, 5·36–5·76 mm (mean 5·53 mm).

Vertex flat.

Male genitalia. Pygophore processes slender, elongate, directed posteriorly at base and turned dorsoposteriorly near midlength, tapering to acute spatulate apex, a small lamellate extension subapically on ventral margin. Subgenital plates as in *harpago* but without setae on dorsolateral margin except for basal group. Styles with apical process elongate, expanding towards apex over distal half, then abruptly narrowed subapically to acute upturned apex. Aedeagus short, robust, without basal apodeme; shaft short, wide and broadly rounded apically in lateral aspect, laterally compressed, directed dorsally and recurved anterodorsally; gonopore extending approximately one-third length of shaft; anterior incision extending to near midlength of shaft.

Remarks. This species is most closely related to *nereus* from the Philippines but differs in having the pygophore processes directed dorsoposteriorly at their midlength rather than subapically, and without an acutely ridged ventral margin over their distal half. (See additional remarks under *nereus*.)

Material examined

Holotype ♂, **Philippines**: Mindanao, Misamis Or., Mt Empagatao, 1100–1600 m, 22.iv.1961 (*H. M. Torrevillas*) (BPBM, Type No. 12,569).

Paratypes. **Philippines**: 5 ♂, Mindanao (BPBM, FMNH).

Batracomorphus brooksi Evans

(Figs 869–874)

Batrachomorphus brooksi Evans, 1972: 654. Holotype ♂, Australia (AM) [examined].

Length: ♂, 5·75 mm.

Pronotum with irregular dark brown markings along anterior margin.

Vertex flattened.

Male genitalia. Pygophore processes short, membranous, finger-like, directed posteriorly. Subgenital plates with basal stem and lobe as in *harpago*, dorsoventrally compressed; a multiseriate row of reclined setae along distal half of dorsal surface to just before apex, with minute setae only over rest of plate. Styles with apical process elongate, slender, of approximately uniform width throughout length except for slight constriction at midlength, tapering distally to acute upturned apex. Aedeagus short, robust, without basal apodeme; shaft short, wide and broadly rounded apically in lateral aspect, laterally compressed, directed dorsally and recurved anterodorsally; gonopore extending approximately one-third length of shaft; anterior incision extending to just distad of midlength of shaft.

Remarks. This species is one of a group of four characterised by the shape of the vertex and male genitalia as described under *nereus*. It differs slightly from others in the group in the subgenital plates and the shape of the styles but is clearly related in all other respects. It is distinguished from the other three species not only by its subgenital plates and styles but also by the shape of the pygophore processes.

Distribution. Australia.

Material examined

Batrachomorphus brooksi Evans, holotype ♂, **Australia**: Queensland, Cairns, xii.1969 (*J. Brooks*) (AM) [not 'Kuranda' as stated in the original description].

Batracomorphus ogasawarensis (Matsumura)

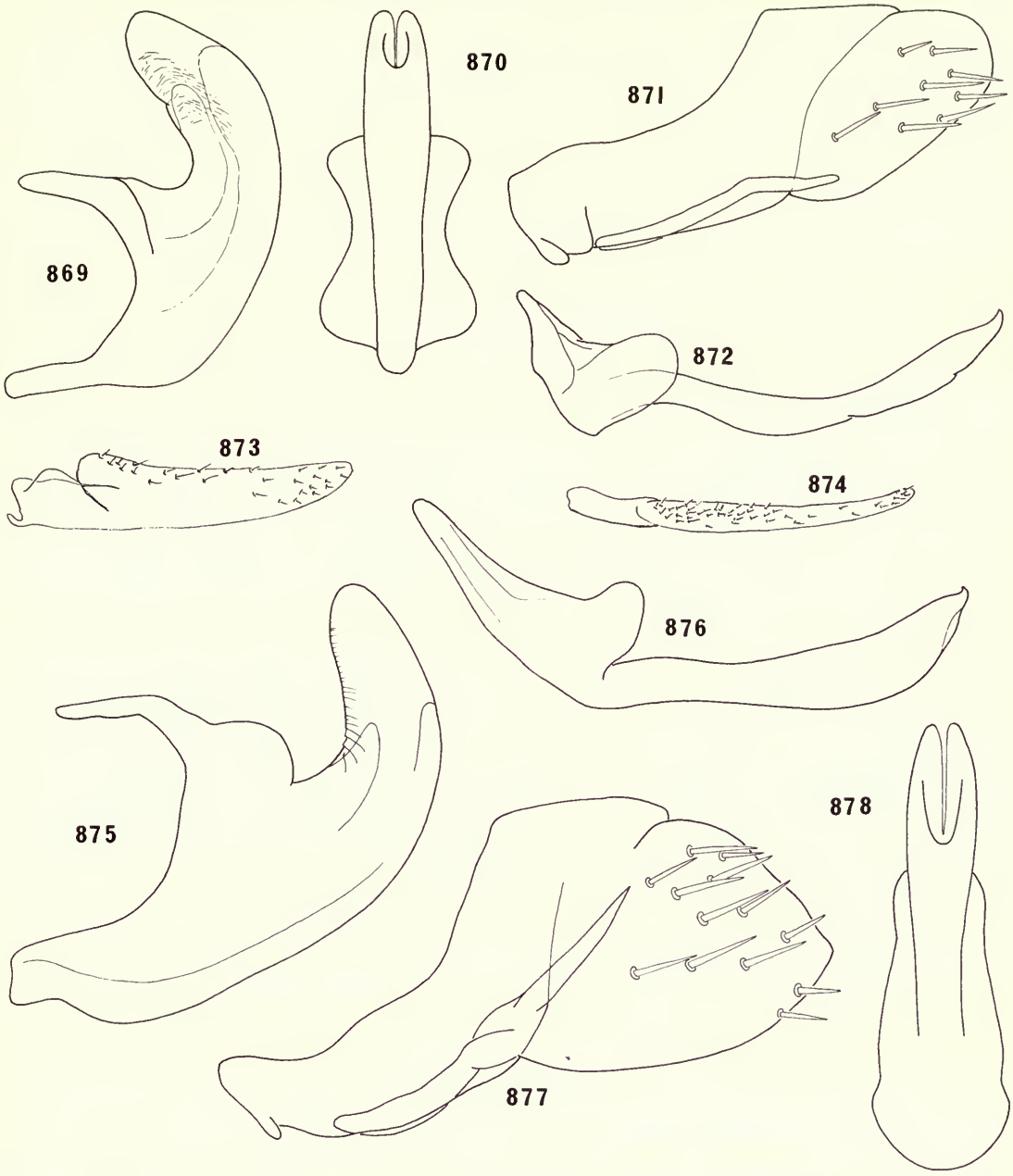
(Figs 875–878)

Macropsis ogasawarensis Matsumura, 1912: 299. Lectotype ♂, Bonin Islands (EIHU) [examined].

Length: ♂, 5·30 mm.

Vertex flat and very slightly produced medially.

Male genitalia. Pygophore processes slender, directed dorsoposteriorly from base, apex acute and



Figs 869–878 869–874, *Batracomorphus brooksi* (holotype). (869, 870) aedeagus; (871) pygophore; (872) style; (873) left subgenital plate, ventral view; (874) same, left lateral view. 875–877, *B. ogasawarensis* (lectotype). (875) aedeagus; (876) style; (877) pygophore; (878) aedeagus. (For further explanation see 'Techniques and methods'.)

curving dorsolaterally. Subgenital plates as in *harpago* but without dorsal or ventral setae except for basal group. Styles with apical process elongate, slender, expanding towards apex over distal half and abruptly tapered subapically to acute upturned apex. Aedeagus short, robust, without basal apodeme; shaft short, wide and broadly rounded apically in lateral aspect, laterally compressed, directed dorsally and turned slightly anterodorsally; gonopore extending to near midlength of shaft; anterior incision extending to just basad of midlength of shaft.

Remarks. This species is one of a group of four characterised by the shape of the vertex and male genitalia, as described under *nereus*. It differs from the others in the group by having the vertex slightly produced medially and by the total absence of setae on the subgenital plates except for the basal group. It is further distinguished by the pygophore processes which are directed dorsoposteriorly from their base.

Distribution. Bonin Islands.

Material examined

Macropsis ogasawarensis Matsumura, lectotype ♂, **Bonin Islands**: Ogasawara, 20.viii.1905 (*Matsumura*) (EIHU).

Batracomorphus cyprian sp. n.

(Figs 879–883)

Length: ♂, 5·68–6·72 mm (mean 6·22 mm).

Vertex flat.

Male genitalia. Pygophore processes directed posteriorly, terminating in two dentate projections, one directed posteriorly and sometimes curving ventrally and the other ventrally. Subgenital plates as in *harpago* but without dorsal setae except for basal group. Styles with apical process elongate, its distal half more expanded than basal and with ventral margin keel-like and mildly serrate, tapering subapically to acute upturned apex. Aedeagus with shaft elongate, directed dorsally, laterally compressed with small sometimes reduced lamellate expansions subapically on each anterolateral margin, terminating in a pair of slender processes directed anterolaterally at base and then ventrally approximately one-third length of shaft; gonopore very short; anterior incision minute.

Remarks. This species is one of a group of three (*cyprian, adrastus* and *laodamia*) which are characterised by having the vertex flattened, the subgenital plates as in *harpago* but with the dorsal setae absent except for the basal group, and the aedeagus with a pair of slender processes apically, the gonopore short and the anterior incision absent or very small. The species in this group, which occurs in the Philippines and Borneo, resemble *rhesus* from the Philippines in the shape of the aedeagus but differ in having a relatively shorter gonopore, a flattened vertex and the absence of dorsal setae on the subgenital plates except for the basal group. The present species is most closely related to *laodamia* from the Philippines and Borneo but is larger and has the pygophore processes and styles more robust apically.

Material examined

Holotype ♂, **Philippines**: Mindanao, Misamis Or., Mt Balatukan, 15 km SW. of Gingoog, 1000–2000 m, 27–30.iv.1960 (*H. M. Torrevillas*) (BPBM, Type No. 12,570).

Paratypes. **Philippines**: 3 ♂, 1 ♀, Leyte, Luzon and Mindanao (AMNH, BPBM).

Batracomorphus adrastus sp. n.

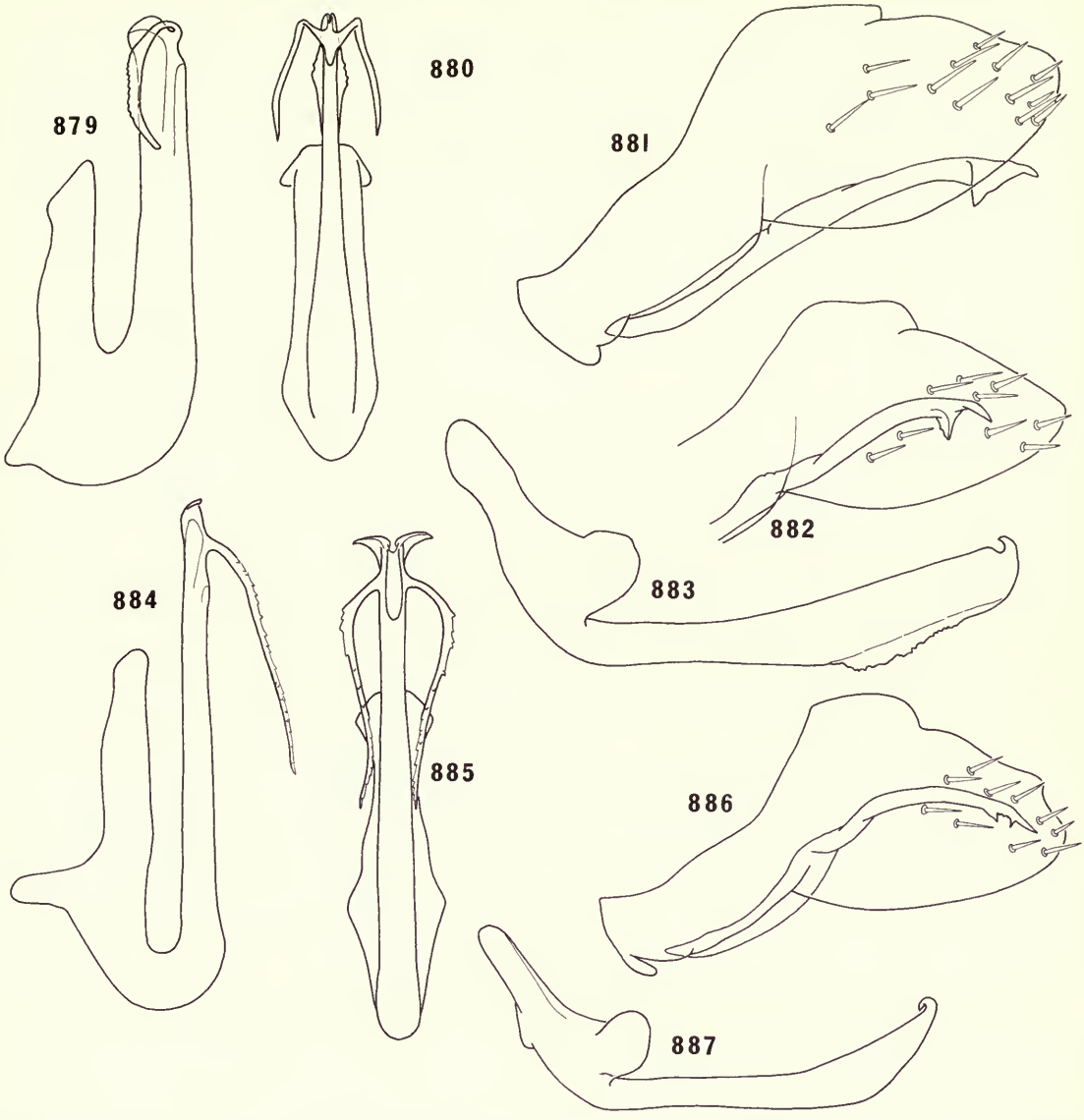
(Figs 884–887)

Length: ♂, 4·80–5·12 mm (mean 4·96 mm).

Vertex flat.

Male genitalia. Pygophore processes slender, directed posteriorly and slightly arched, apex acute with 2–3 small teeth subapically on ventral margin. Subgenital plates as in *cyprian*, basal lobe small. Styles with apical process elongate, expanded over its distal half and tapering gradually to acute dorsally hooked apex. Aedeagus with shaft long, slender, directed dorsally, terminating in a pair of small, laterally directed, triangular expansions; a pair of filamentous subapical processes, directed ventrally to approximately midlength of shaft, their surface irregularly adorned with small conical barbs; gonopore extending approximately one-sixth length of shaft; anterior incision very short.

Remarks. This species is one of a group of three characterised by the shape of the vertex and male genitalia as described under *cyprian*. It differs from the others in the group in having the shaft of the aedeagus more slender and terminating in triangular expansions and the subapical processes longer. It differs also in the more slender pygophore processes and styles.



Figs 879–887 879–883, *Batracomorphus cyprian*. (879, 880) aedeagus; (881) pygophore; (882) pygophore; (883) style. 884–887, *B. adrastus*. (884, 885) aedeagus; (886) pygophore; (887) style. (For further explanation see 'Techniques and methods'.)

MATERIAL EXAMINED

Holotype ♂, **Borneo**: Sarawak, foot of Mt Dulit, junction of rivers Tinjar and Lejok, 26.viii.1932 (*B. M. Hobby & A. W. Moore*) (BMNH).

Paratypes. **Borneo**: 8 ♂, 2 ♀, Sabah and Sarawak (BMNH, BPBM).

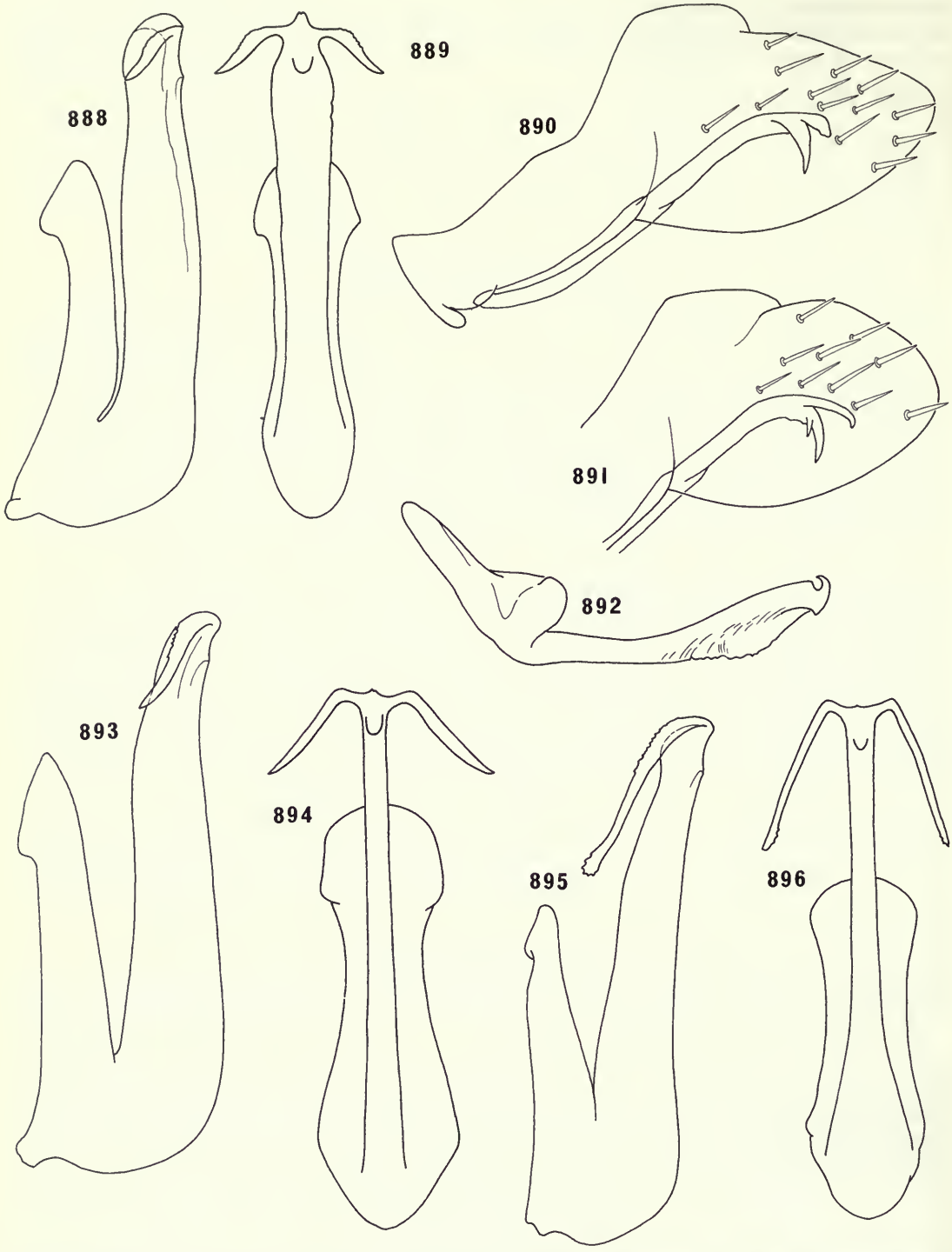
Batracomorphus laodamia sp. n.

(Figs 888–896)

Length: ♂, 4·88–5·20 mm (mean 5·00 mm).

Vertex flat.

Male genitalia. Pygophore processes slender, directed dorsoposteriorly with distal third turned pos-



Figs 888–896 *Batracomorphus laodamia.* 888, 889, aedeagus (Philippines); 890, pygophore (Philippines); 891, same (Borneo); 892, style; 893, 894, aedeagus (Borneo); 895, 896, aedeagus (Borneo). (For further explanation see 'Techniques and methods'.)

teriorly and terminating in two ventrally directed dentate projections. Subgenital plates as in *cyprian*. Styles with apical process slender, of approximately uniform width but with lamellate expansion on ventral margin over distal half, tapering distally to acute upturned apex. Aedeagus with shaft slender, laterally compressed, directed dorsally, posterolateral margins sometimes expanded keel-like over distal half; a pair of slender processes apically, directed laterally at their base and then ventrolaterally; gonopore very short; anterior incision absent.

REMARKS. This species varies somewhat in the shape of the aedeagus. The specimens from Borneo differ from those from the Philippines in the absence of posterolateral keels on the distal half of the aedeagus and in having the apical processes longer in some cases, variation in the length of the apical processes occurring among specimens from the same locality. The specimens from Borneo also sometimes have an additional short spine on the more ventral of the projections at the apex of the pygophore processes, its presence or absence also varying within the same locality.

The present species is most closely related to *cyprian* from the Philippines but is much smaller with the styles and pygophore processes less robust. (See additional remarks under *cyprian*.)

MATERIAL EXAMINED

Holotype ♂, **Philippines**: Palawan, Mantalingajan, Pinigisan, 600 m, 13.ix.1961 (ZM).

Paratypes. **Borneo**: 3 ♂, Sabah and Sarawak (BPBM). **Philippines**: 1 ♂, Balabac (ZM).

Batracomorphus dymas sp. n.

(Figs 897–902)

Length: ♂, 4·88–4·96 mm (mean 4·92 mm).

Forewings darker than body with two transverse whitish bands, one at midlength of clavus and other at apex of clavus; pronotum, scutellum and forewings mottled with small dark brown spots.

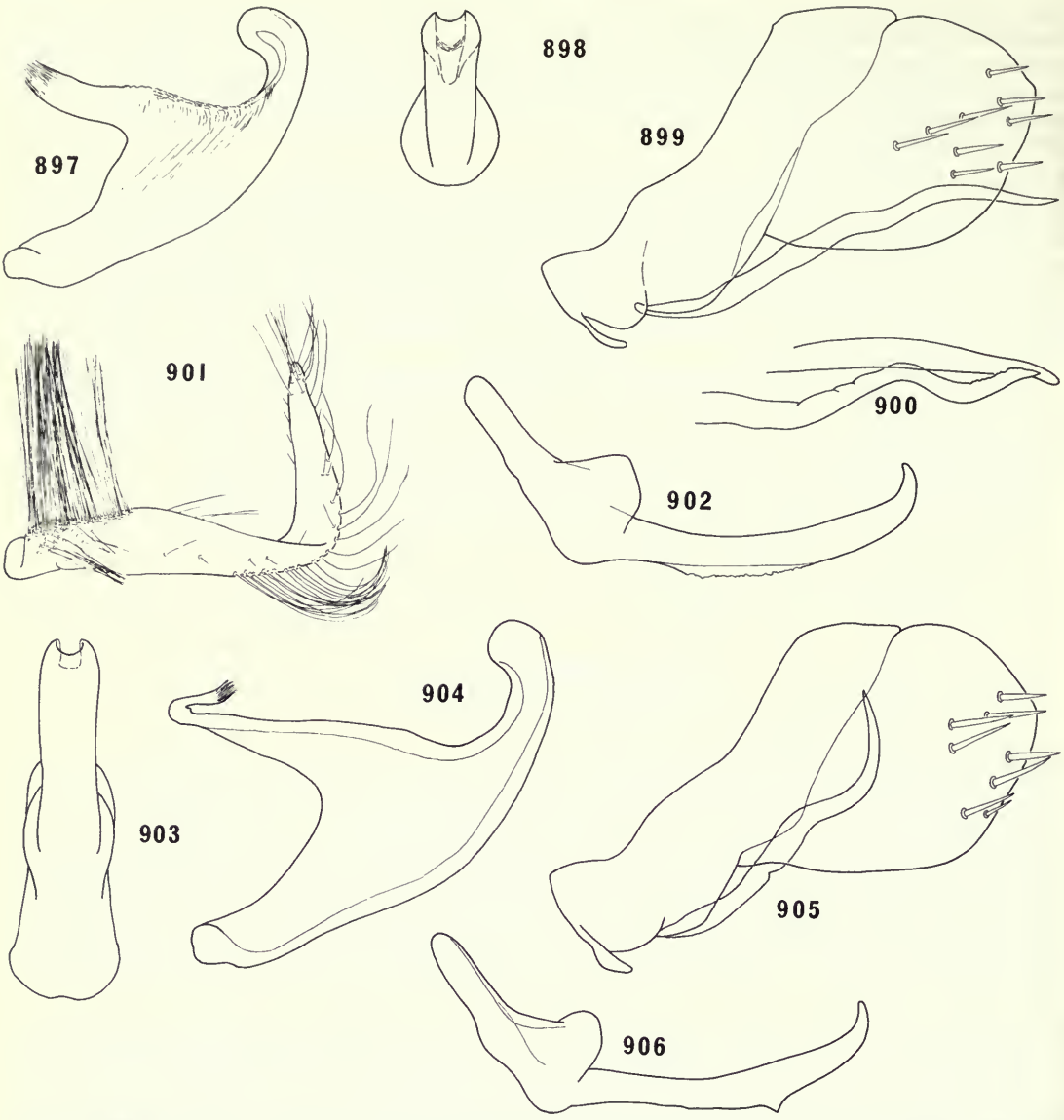
Male genitalia. Pygophore processes slender, directed dorsoposteriorly to midlength then posteriorly, apex acute. Subgenital plates as in *harpago* but turned dorsally near midlength, basal stem short, a group of long hair-like setae basally on dorsolateral margin, another at midlength on ventral margin and a third at apex. Styles with apical process elongate, slender, of uniform width, tapering distally to acute upturned apex; ventral margin acutely ridged and weakly serrate over basal half. Aedeagus short, robust, basal apodeme absent; shaft short, directed dorsally and recurved anteriorly; gonopore apical; anterior incision very short.

REMARKS. This species is one of a group of three (*dymas, remus* and *lentiginosus*) which are characterised by having the subgenital plates as in *harpago* but without setae on the dorsal margin except for the basal group and with the basal stem short, the aedeagus short and robust, without a basal apodeme and with the shaft recurved anteriorly and with a short gonopore and anterior incision, the apical process of the styles slender, of approximately uniform width and turned dorsad at the apex, and the pygophore processes elongate and slender. All three species are further characterised by having transverse whitish bands across the forewings and small dark brown spots on the dorsum. The species in this group, which occurs in New Guinea and Australia, are similar to *nereus, tullus, brooksi* and *ogasawarensis* from Australia, Philippines and the Bonin Islands, in the shape of the aedeagus and subgenital plates but differ in having the basal stem of the plates much smaller, the shaft of the aedeagus more slender, the apical process of the style of uniform width, and the vertex regularly rounded to the face rather than flattened. The present species differs from the others in the group by having relatively longer and posteriorly directed pygophore processes.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

Paratypes. **New Guinea**: 2 ♂, same data as holotype (BMNH).



Figs 897–906 897–902, *Batracomorphus dymas*. (897, 898) aedeagus; (899) pygophore; (900) left pygophore lobe and process, ventral view; (901) left subgenital plate, left lateral view; (902) style. 903–906, *B. remus* (903, 904) aedeagus; (905) pygophore; (906) style. (For further explanation see 'Techniques and methods'.)

Batracomorphus remus sp. n.

(Figs 903–906)

Length: ♂, 4·56–4·72 mm (mean 4·64 mm).

Forewings greyish, basal area to apex of scutellum dark brown, a broad transverse band at midlength and apical area distad of clavus pale brownish; vertex, pronotum and forewings sparsely speckled with small dark brown spots; scutellum pale brown with basal angles and broad area on each side of midline dark brown.

Male genitalia. Pygophore processes slender, directed posteriorly at base then curving dorsally, apex acute. Subgenital plates as in *dymas*. Styles with apical process elongate, slender, of approximately

uniform width, tapering distally to acute upturned apex, a small thorn-like projection on ventral margin just distad of midlength. Aedeagus short, robust, basal apodeme absent; shaft short, directed dorsally and slightly recurved anteriorly; gonopore apical; anterior incision very short.

REMARKS. The present species is one of a group of three characterised by the shape of the male genitalia and the pigmentation of the dorsum, as described under *dymas*. It differs from the other two in the group by having the pygophore processes directed dorsally rather than posteriorly.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

Paratype. **New Guinea**: 1 ♂, same data as holotype.

Batracomorphus lentiginosus (Kirkaldy)

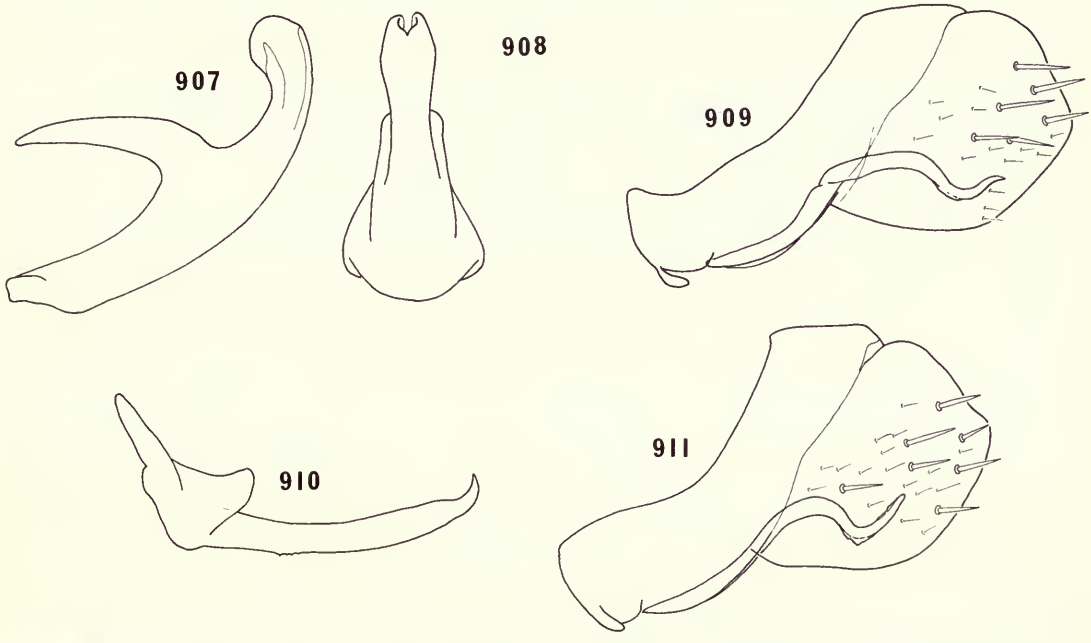
(Figs 907–911)

Eurinoscopus lentiginosus Kirkaldy, 1906: 347. Holotype ♂, AUSTRALIA (BPBM) [examined].
Batrachomorphus fasciatus Evans, 1972: 655. Holotype ♂, AUSTRALIA (AM) [examined]. **Syn. n.**

Length: ♂, 4·00 mm.

Forewings darker than body with three transverse unpigmented bands, one at midlength of clavus, another at apex of clavus and third across base of apical cells, bands sometimes indistinct; forewings densely speckled with small dark brown spots; vertex, pronotum and scutellum sparsely speckled with smaller dark brown spots; clypeus and basal angles of scutellum sometimes dark brown; medial area of vertex, pronotum and scutellum sometimes tinged with dark brown.

Male genitalia. Pygophore processes slender, directed posteriorly, turned posteroventrally at midlength then dorsoposteriorly, apex acute and sometimes turned posteriorly, ventral margin acutely ridged just distad of midlength. Subgenital plates as in *dymas*. Styles with apical process slender, elongate, of approximately uniform width, tapering distally to acute upturned apex. Aedeagus short, robust, basal apodeme absent; shaft short, directed dorsally and slightly recurved anteriorly; gonopore apical; anterior incision very short.



Figs 907–911 *Batracomorphus lentiginosus*. 907, 908, aedeagus (holotype); 909, pygophore (holotype); 910, style (holotype); 911, pygophore (holotype of *B. fasciatus*). (For further explanation see 'Techniques and methods'.)

REMARKS. The present species is most closely related to *dymas* from New Guinea but differs in having the pygophore processes sinuate rather than straight in lateral aspect and with their ventral margin acutely ridged just distad of their midlength. (See additional remarks under *dymas*.)

DISTRIBUTION. Australia, New Guinea.

MATERIAL EXAMINED

Eurinoscopus lentiginosus Kirkaldy, holotype ♂, **Australia**: Queensland, Cairns, viii.1904 (BPBM). *Batrachomorphus fasciatus* Evans, holotype ♂, **Australia**: Queensland, Cairns, L. T., xi.1969 (*J. Brooks*) (AM).

Batracomorphus thestor nom. n.

(Figs 912–917)

Edijassus pallidus Evans, 1972: 657. Holotype ♂, NEW GUINEA (BPBM) [examined]. [Junior secondary homonym of *Batracomorphus pallidus* (Evans, 1935).]

Length: ♂, 8·5 mm.

Irregular dark brown markings along anterior margin of pronotum, basal angles of scutellum, disc of forewings and at apex of both the costal cross-veins and apical veins.

Vertex raised above level of anterior margin of pronotum with its posterior edge strongly declivous; pronotum depressed anteriorly on each side of midline; scutellum transversely depressed at level of scar; forewings with veins elevated, with additional cross-veins basad of subapical cells and on costal margin near apex and with appendix wide.

Male genitalia. Pygophore processes long, slender, curving dorsally near base, expanded slightly subapically then tapering to acute apex. Subgenital plates without basal stem or lobe; a large group of long hair-like setae over basal half of ventrolateral margin and another smaller group at apex on medial surface; a row of shorter setae along medial third of mesal surface just basad of dorsal margin. Styles with apical process elongate, slender, apex upturned. Aedeagus robust basally; shaft relatively short, directed dorsally; gonopore apical on posterior margin; anterior incision short, indistinct.

REMARKS. The original name of this species, herein transferred to *Batracomorphus* for the first time, is a junior secondary homonym of the nomen dubium *Batracomorphus pallidus* (Evans, 1935).

This species differs from all others in certain characters of the head, pronotum, scutellum and forewings and was originally placed in a distinct genus. The subsequent discovery of several closely related species in which these characters are absent suggests that the differences are specific rather than generic in nature. It resembles species of the *acestes*-group and the *dymas*-group, as well as the species *cycnus*, in the general appearance of its genitalia but differs from all in the distribution of setae on the subgenital plates. It is most closely related to *leto* which, in lacking the unique external characters of *thestor*, supports the inclusion of the latter with *Batracomorphus*.

DISTRIBUTION. New Guinea.

MATERIAL EXAMINED

Edijassus pallidus Evans, holotype ♂, **New Guinea**: NE, 11 km S. of Mt Hagen [town], 2200–2300 m, 21.v.1963 (*J. Sedlacek*) (BPBM).

New Guinea: 1 ♀, NE., Edie Creek, Wau, 200 m, 5–11.x.1961 (*Sedlacek*) (BPBM) (allotype of *Edijassus pallidus* Evans).

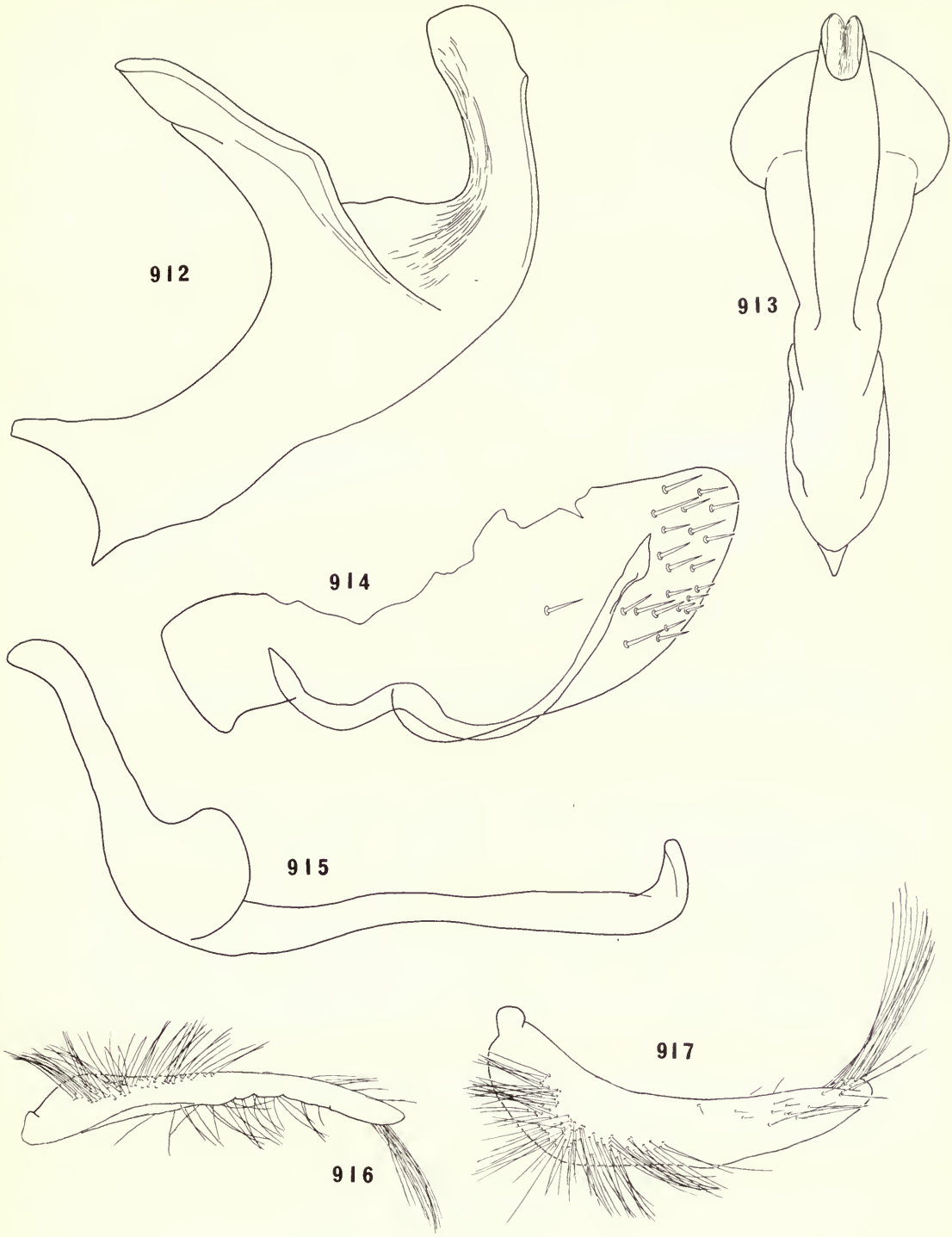
Batracomorphus leto sp. n.

(Figs 918–923)

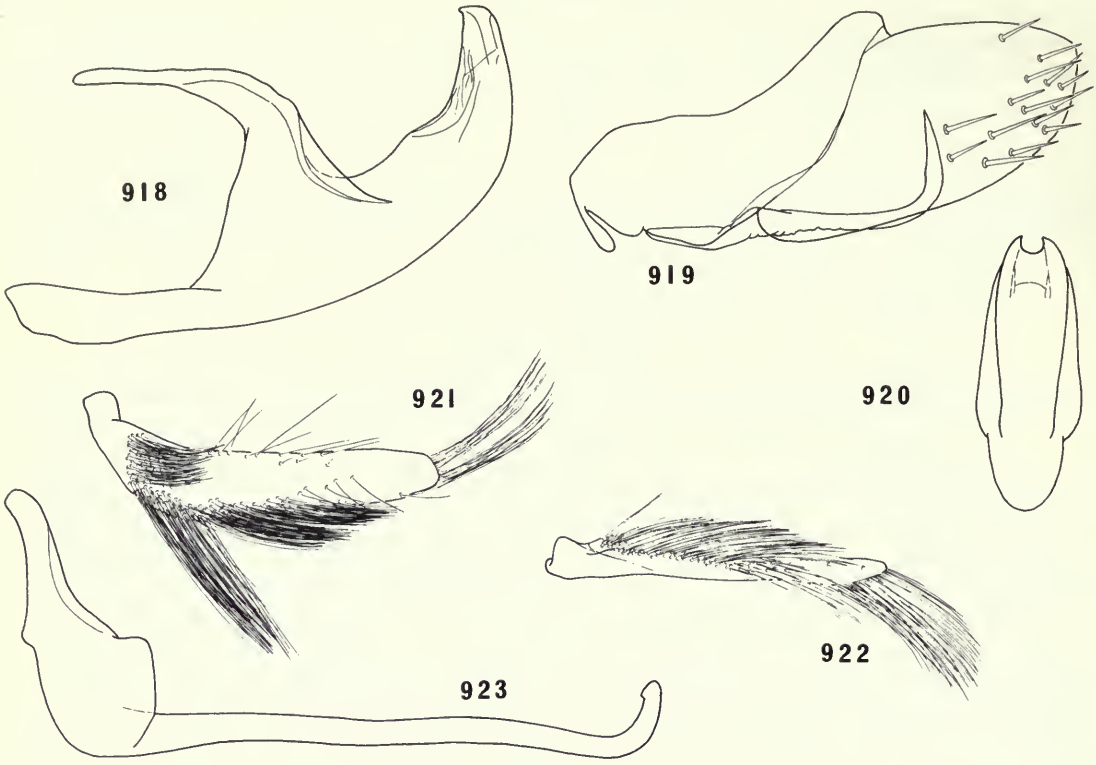
Length: ♂, 6·88–6·96 mm (mean 6·92 mm).

Vertex shorter medially than next eyes, equal in width to pronotum; forewings deeply punctate.

Male genitalia. Pygophore with lateral lobes extending more ventrally than normal; processes slender, directed posteriorly and turned abruptly dorsad just distad of midlength, apex acute. Subgenital plates elongate, slender, basal stem and lobe indistinct; a group of short hair-like setae laterally near base; a



Figs 912–917 *Batracomorphus thestor* (holotype). 912, 913, aedeagus; 914, pygophore; 915, style; 916, left subgenital plate, ventral view; 917, same, left lateral view. (For further explanation see 'Techniques and methods'.)



Figs 918–923 *Batracomorphus leto*. 918, aedeagus; 919, pygophore; 920, aedeagus; 921, left subgenital plate, left lateral view; 922, same, ventral view; 923, style. (For further explanation see 'Techniques and methods'.)

multiseriate row of long hair-like setae along proximal two-thirds of ventral margin; two multiseriate parallel rows of long hair-like setae on distal two-thirds of medial surface, the more dorsal row approximately half length of more ventral one. Styles with apical process very long, slender, turned abruptly dorsad subapically, apex rounded. Aedeagus robust; shaft relatively short, directed dorsally; gonopore apical; anterior incision absent.

Remarks. This species is closely related to *thestor*, the type-species of *Edijassus*, and is intermediate between it and the character states in *Batracomorphus* indicating the congeneric nature of the two genera. The two species differ not only in external characters but also in the shape of the pygophore processes, the position of the gonopore and the distribution of setae on the subgenital plates. The present species is known only from the Finisterre Mountains of New Guinea.

Material examined

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

Paratype. **New Guinea**: 1 ♂, Papua New Guinea (BMNH).

Batracomorphus boschmai Blöte

(Figs 924–929)

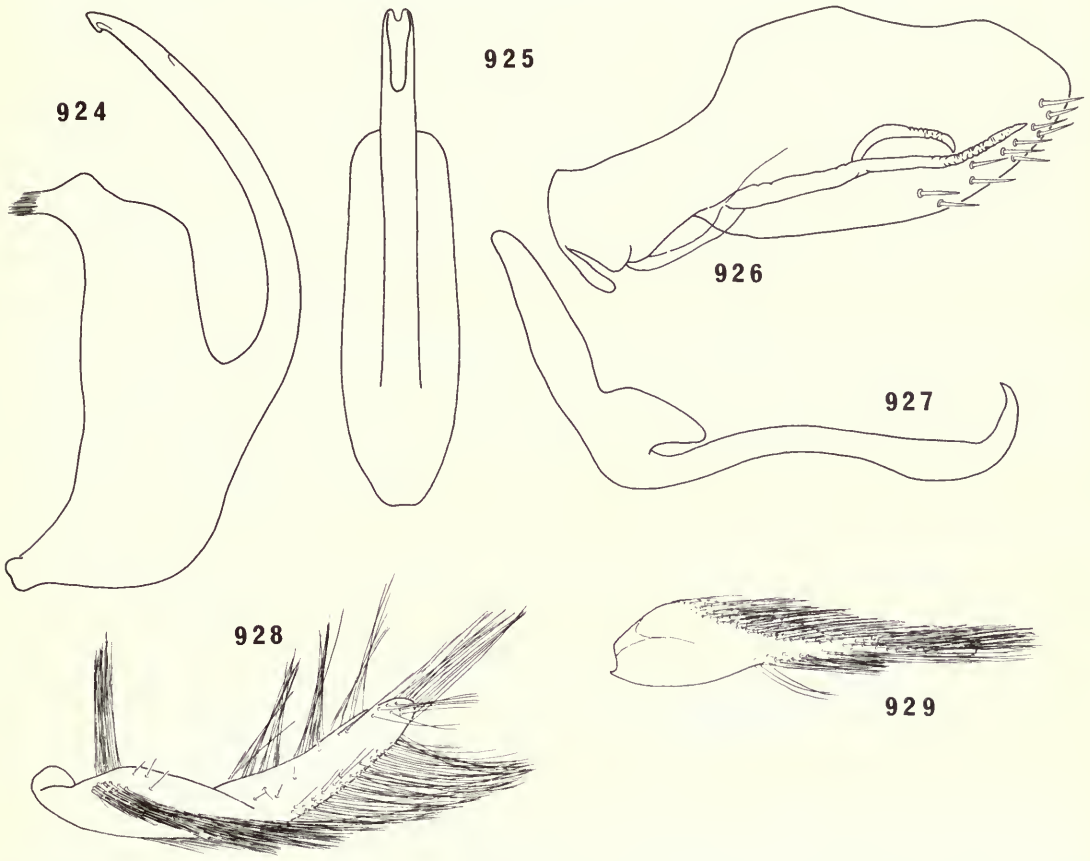
Batrachomorphus boschmai Blöte, 1964: 467. Holotype ♂, New Guinea (RNH) [examined].

Length: ♂, 7.00 mm.

Vertex with a small mark on each side midway between midline and eye and a series along anterior border of pronotum, red.

Vertex flat with anterior ridge.

Male genitalia. Pygophore with lateral lobes extending more ventrad than normal; processes slender, directed posteriorly, apical third crenulate, apex acute, a short slender process arising mesally near its midlength and directed posteriorly for approximately one-fourth length of main process, its apex acute and turned ventrally. Subgenital plates with basal stem and lobe indistinct; a group of long hair-like setae dorsolaterally at base; a multiseriate row of long setae laterally over basal half, becoming ventrolateral over distal half; a multiseriate row of long setae ventrally, commencing slightly distad of lateral row and paralleling it; a multiseriate row of long setae along distal half of dorsomesal margin. Styles with apical process elongate, slender, of approximately uniform width, slightly expanded distad of midlength and tapering to acute upturned apex. Aedeagus simple, enlarged basally; shaft slender, directed dorsally and turned anterodorsally near base; gonopore extending approximately one-sixth length of shaft; anterior incision very short.



Figs 924–929 *Batracomorphus boschmai* (holotype). 924, 925, aedeagus; 926, pygophore; 927, style; 928, left subgenital plate, left lateral view; 929, same, ventral view. (For further explanation see 'Techniques and methods'.)

Remarks. This species resembles the previous two in the shape of its style and the following seven in the shape of its aedeagus. It may be readily distinguished from all these, however, in having the pygophore processes bifid.

Distribution. New Guinea.

Material examined

Batrachomorphus boschmai Blöte, holotype ♂, **New Guinea**: Araboebivak, 6.x.1939 (RNH).

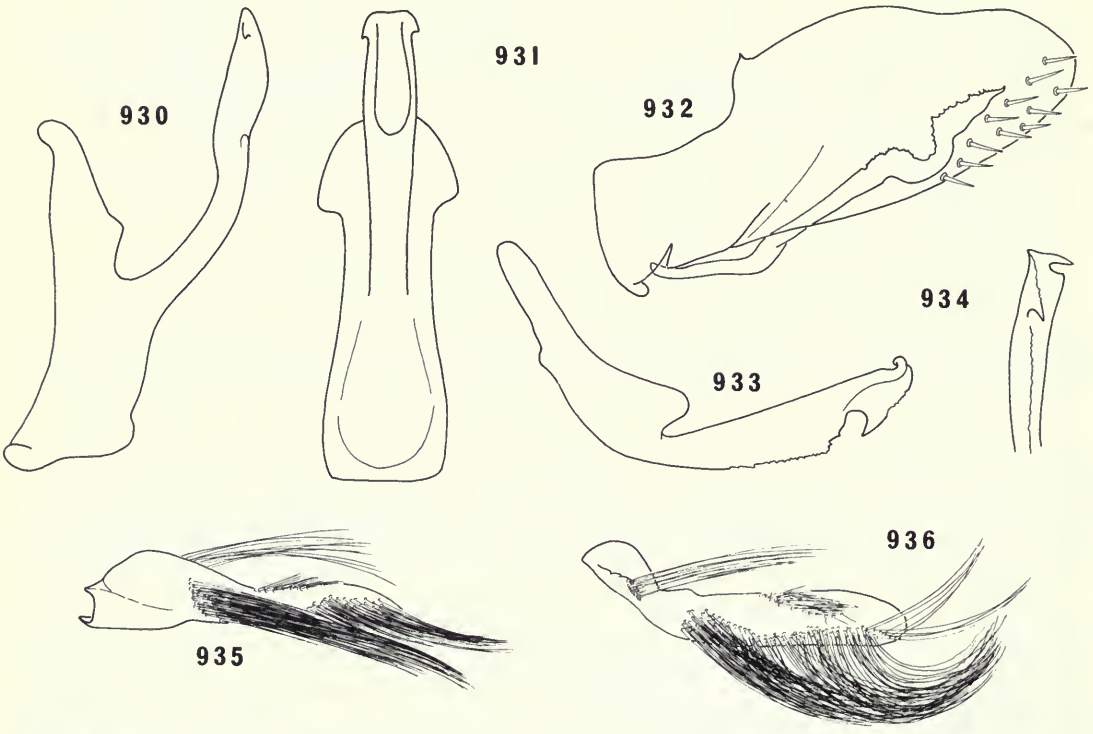
Batracomorphus semele sp. n.

(Figs 930–936)

Length: ♂, 5·44 mm.

Vertex flattened.

Male genitalia. Pygophore with lateral lobes extending more ventrad than normal; processes robust, directed dorsoposteriorly, sinuate over apical half and terminating in triangular expansion, dorsal margin irregularly serrate over distal half. Subgenital plates with basal stem and lobe indistinct; a multiseriate row of long hair-like setae along ventrolateral margin over distal three-fourths; a small group of similar setae laterally near base and another group of slightly shorter setae slightly more distad on medial margin; a group of much shorter setae on dorsolateral margin immediately distad of midlength. Styles with apical process expanding towards apex over basal two-thirds and then tapering rapidly to acute mesally directed apex, ventral margin acuminate and minutely serrate to near apex; a lamellate ventrally directed acute expansion subapically on ventral margin. Aedeagus robust basally; shaft slender, directed dorsally, slightly expanded over distal half and terminating in a pair of small lateral barbs; gonopore extending one-third length of shaft; anterior incision absent.



Figs 930–936 *Batracomorphus semele*. 930, 931, aedeagus; 932, pygophore; 933, style; 934, style apex, ventral view; 935, left subgenital plate, ventral view; 936, same, left lateral view. (For further explanation see 'Techniques and methods'.)

Remarks. This species is one of a group of seven (*semele, nitens, hermes, xanthus, briseis, artemis* and *iris*) which are characterised by having the vertex flattened, the pygophore lobes extending more ventrad than normal, the subgenital plates densely setose with the basal stem and lobe indistinct, the apical process of the styles abruptly narrowed distally and with a pronounced subapical expansion or process ventrally, and the aedeagus simple, slender and without an anterior incision. The species in this group, which occurs in New Guinea and New Britain, resemble *anubis* from New Guinea in the shape of the aedeagus and pygophore but differ in the subgenital plates and styles. The styles resemble those of *otus, melampus* and *hector* from West Malaysia but the two groups differ considerably in the shape of the aedeagus,

subgenital plates and pygophore as well as the vertex. The present species differs from all others in the group in having sinuate and dorsally serrate pygophore processes and the shaft of the aedeagus arising more dorsally from the socle.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

Batracomorphus nitens Blöte

(Figs 937–940)

Batrachomorphus nitens Blöte, 1964: 466. Holotype ♂, NEW GUINEA (RNH) [examined].

Length: ♂, 5·5 mm.

Vertex flattened.

Male genitalia. Pygophore processes slender, directed posteriorly, turned slightly ventroposteriorly distally, slightly expanded subapically then tapering to acute apex. Subgenital plates as in *boschmai* but without the shorter mesoventral row of setae; dorsal group at base slightly larger, its setae clubbed apically and variable in length, the longest reaching to apex of plate; a few long setae on laterodorsal edge of basal lobe. Styles with apical process expanding towards midlength then abruptly narrowed to arched distal half and terminating in acute dorsally hooked apex, a finger-like ventrally directed projection subapically on ventral margin, ventral margin minutely dentate at midlength. Aedeagus simple; shaft slender, directed dorsally and terminating in a pair of small lateral lobes; gonopore extending approximately one-sixth length of shaft; anterior incision absent.

REMARKS. The present species is most closely related to *hermes* from New Guinea but differs in having the apical expansions on the shaft of the aedeagus relatively smaller, the gonopore shorter and the posterior margin of the socle without a projection. The apical process of the style is also constricted more basally, is dentate ventrally at midlength and has the subapical projection situated more distad and longer than the more apical portion of the process. (See additional remarks under *semele*.)

DISTRIBUTION. New Guinea.

MATERIAL EXAMINED

Batrachomorphus nitens Blöte, holotype ♂, **New Guinea**: Araboebivak, 4.x.1939 (RNH).

Batracomorphus hermes **sp. n.**

(Figs 941–944)

Length: ♂, 5·28 mm.

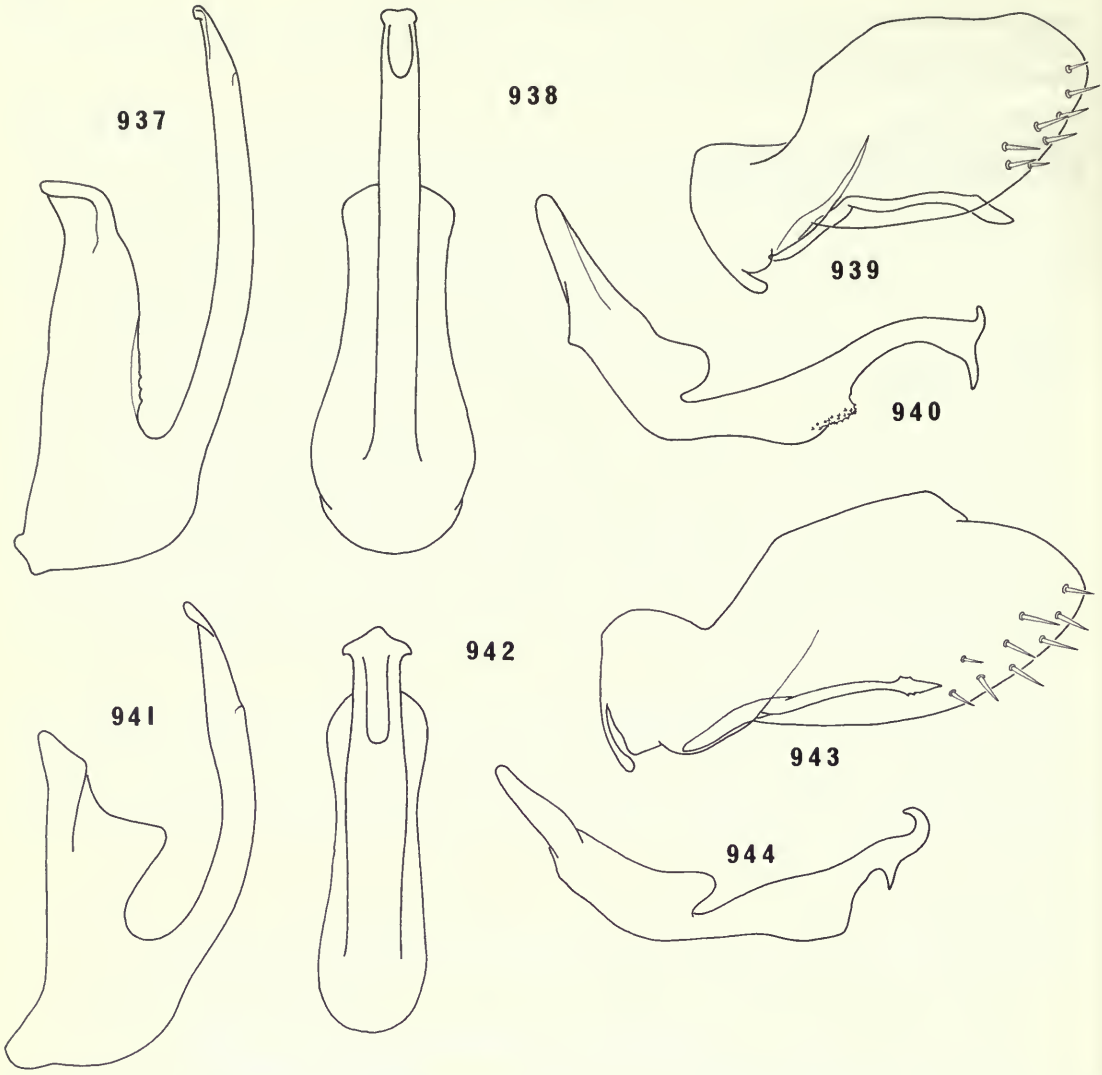
Vertex flattened.

Male genitalia. Pygophore processes slender, directed posteriorly, slightly expanded subapically and barbed, apex acute. Subgenital plates as in *semele* but ventrolateral multiseriate row of hair-like setae over distal three-fourths also extending over ventromesal margin, group of short setae on dorsolateral margin immediately distad of midlength long and hair-like on basal half of group, and group of setae on medial margin at base missing. Styles with apical process expanded markedly to midlength then abruptly narrowed to slender dorsomesally hooked apex, a triangular ventrally directed projection on ventral margin immediately distad of midlength. Aedeagus simple; socle with conical projection on its posterior margin; shaft slender, directed dorsally, terminating in a pair of lateral barb-like expansions; gonopore extending approximately one-fourth length of shaft; anterior incision absent.

REMARKS. The present species is most closely related to *nitens* from New Guinea but differs as described under that species (See additional remarks under *semele*.)

Material examined

Holotype ♂, **New Guinea**: Irian Jaya, Humboldt Bay District, Bewani Mts, 400 m, vii.1937 (*W. Stüber*) (BMNH).



Figs 937–944 937–940, *Batracomorphus nitens* (holotype). (937, 938) aedeagus; (939) pygophore; (940) style. 941–944, *B. hermes*. (941, 942) aedeagus; (943) pygophore; (944) style. (For further explanation see 'Techniques and methods'.)

Batracomorphus xanthus sp. n.

(Figs 945–950)

Length: ♂, 4·96–5·44 mm (mean 5·21 mm).

Vertex flattened.

Male genitalia. Pygophore processes slender, directed posteriorly with apical third turned abruptly ventrally, tapering to apex with latter turned dorsoposteriorly, with two short lateral projections subapically, the more basad one longer than other. Subgenital plates as in *semele* but with ventrolateral multiseriate row of hair-like setae extending onto ventral half of mesal surface along entire length of row and along dorsomesal margin over apical third of plate, and dorsolateral group of shorter setae near midlength absent. Styles with apical process expanding to midlength then narrowing to acute dorsomesally hooked apex, ventral margin acutely ridged and minutely serrate at midlength, a long ventrally directed dagger-like projection subapically on ventral margin. Aedeagus simple; shaft slender, directed dorsally,

terminating in a pair of lateral barb-like expansions; gonopore extending approximately one-fourth length of shaft; anterior incision absent.

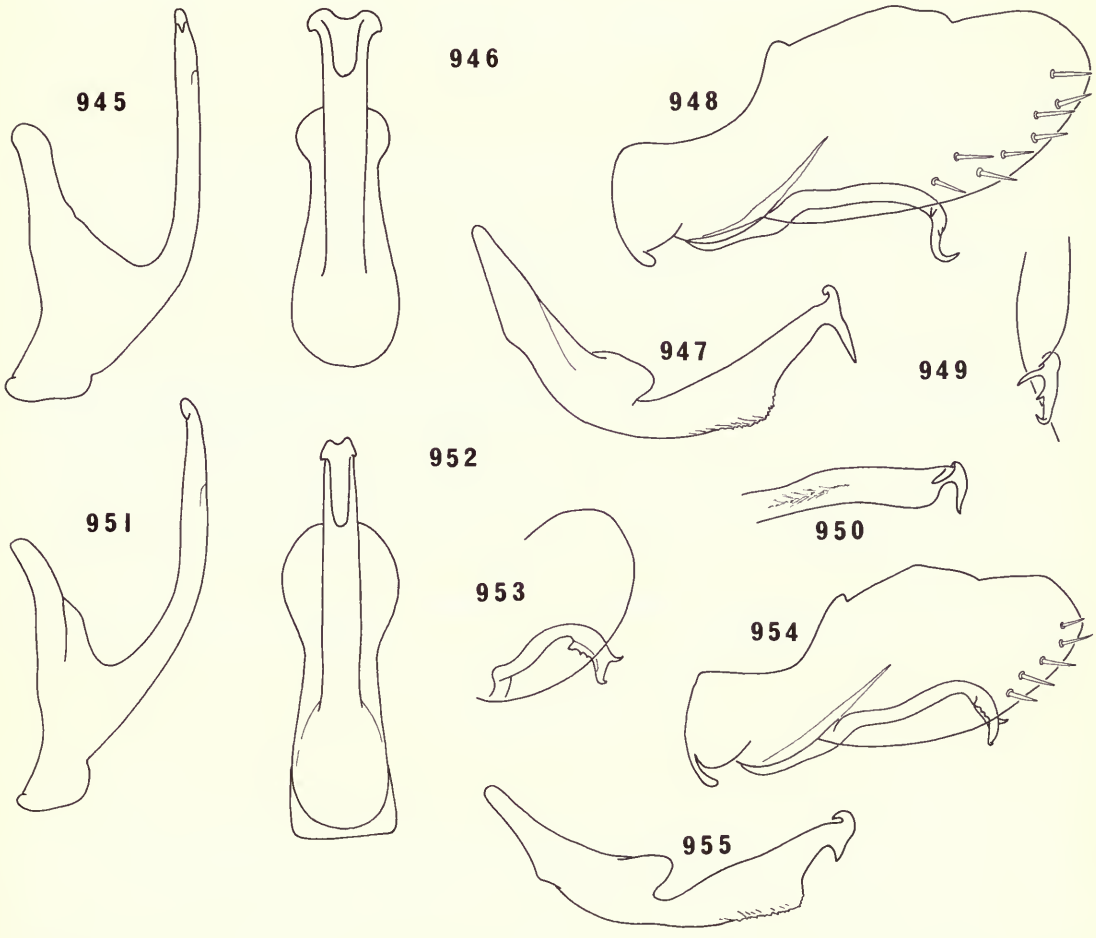
REMARKS. The New Britain specimens of this species have the apical process of the style abruptly narrowed, almost vertically, and the distal neck-like portion very short.

The present species is most closely related to *briseis* from New Guinea but differs in having the subapical projection on the style much longer, the apical barb-like expansions on the shaft of the aedeagus relatively larger and the pygophore processes with two thorn-like projections laterally on distal third rather than ridged and without a subapical spur mesally. (See additional remarks under *semele*.)

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

Paratypes. **New Guinea**: 4 ♂, same data as holotype (BMNH). **New Britain**: 8 ♂ (BPBM).



Figs 945–955 945–950, *Batracomorphus xanthus* (New Guinea specimens). (945, 946) aedeagus; (947) style; (948) pygophore; (949) left pygophore lobe and process, posterior view; (950) left style, ventral view. 951–955, *B. briseis*. (951, 952) aedeagus; (953) left pygophore lobe and process, posterolateral view; (954) pygophore; (955) style. (For further explanation see 'Techniques and methods'.)

Batracomorphus briseis sp. n.

(Figs 951–955)

Length: ♂, 4·88 mm.

Male genitalia. Pygophore processes slender, directed posteriorly, apical third turned abruptly ventrally, tapering to acute apex, lateral margin of apical third acutely ridged and slightly dentate, a small subapical spur-like spine on mesal margin. Subgenital plates as in *xanthus*. Styles with apical process expanding towards midlength then abruptly narrowed to acute dorsomesally hooked apex, ventral margin acuminate and minutely dentate at midlength; a small ventrally directed triangular expansion subapically. Aedeagus simple; shaft slender, directed dorsally, terminating in a pair of small lateral barb-like expansions; gonopore extending approximately one-fourth length of shaft; anterior incision absent.

Remarks. The present species is one of a group of seven characterised by the shape of the vertex and male genitalia, as described under *semele*. It differs from the others, however, in having the vertex rounded rather than flattened. It is most closely related to *xanthus* from New Guinea and New Britain but differs as described under that species.

Material examined

Holotype ♂, **New Guinea**: Papua New Guinea, Kokoda, 365 m, ix.1933 (*L. E. Cheesman*) (BMNH).

Batracomorphus artemis sp. n.

(Figs 956–960)

Length: ♂, 5·20 mm.

Vertex flattened.

Male genitalia. Pygophore processes slender, directed posteriorly, turned ventroposteriorly at midlength and then laterally, apex acute and turned posteriorly, a small spur-like projection on dorsal margin just basad of apex. Subgenital plates as in *xanthus*. Styles with apical process slightly expanded over midlength, its ventral margin acutely ridged, tapering gradually to acute dorsomesally hooked apex; a short ventrally directed dagger-like projection subapically on ventral margin. Aedeagus simple; shaft slender, directed dorsally, terminating in a pair of small lateral barb-like lobes; gonopore extending approximately one-third length of shaft; anterior incision absent.

Remarks. The present species is one of a group of seven characterised by the shape of the vertex and male genitalia as described under *semele*. It differs from the majority in the group, however, in having the apical process of the style only slightly expanded and gradually narrowed to the apex. It is most closely related to *iris* from New Guinea but differs in having a pronounced subapical projection on the style, a much smaller subapical projection on the dorsal margin of the pygophore process, and the shaft of the aedeagus more slender in posterior aspect and with a pair of small apical lobes.

Material examined

Holotype ♂, **New Guinea**: Papua New Guinea, Morobe District, Herzog Mts, Vagau, 1219 m, 4–17.i.1965 (*M. E. Bacchus*) (BMNH).

Batracomorphus iris sp. n.

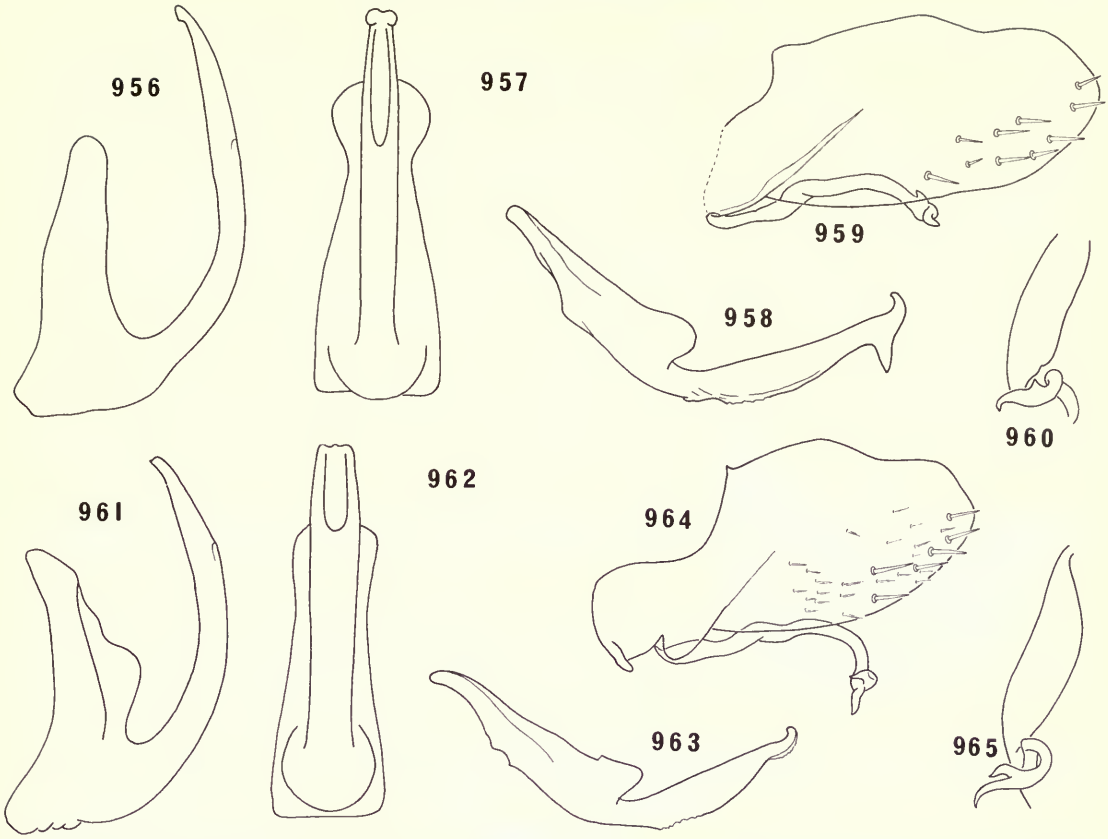
(Figs 961–965)

Length: ♂, 4·80 mm.

Vertex flattened.

Male genitalia. Pygophore processes slender, directed posteriorly, turned ventrally at midlength then laterally, apex acute and turned ventrally, a short laterally directed finger-like projection on dorsal margin just basad of apex. Subgenital plates as in *semele* but dorsolateral group of setae at midlength long and hair-like and ventrolateral multiseriate row extending over ventromedial surface. Styles with apical process slightly expanded over midlength, its ventral margin acutely ridged, tapering gradually to acute dorsomesally hooked apex. Aedeagus simple; shaft slender, directed dorsally; gonopore extending approximately one-fourth length of shaft; anterior incision absent.

Remarks. The present species is one of a group of seven characterised by the shape of the vertex and male genitalia as described under *semele*. It differs from the majority in the group, however,



Figs 956–965 956–960, *Batracomorphus artemis*. (956, 957) aedeagus; (958) style; (959) pygophore; (960) left pygophore lobe and process, posterior view. 961–965, *B. iris*. (961, 962) aedeagus; (963) style; (964) pygophore; (965) left pygophore lobe and process, posterior view. (For further explanation see 'Techniques and methods'.)

in having the apical process of the style only slightly expanded and gradually tapered to the apex. It is most closely related to *artemis* from New Guinea but differs as described under that species.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

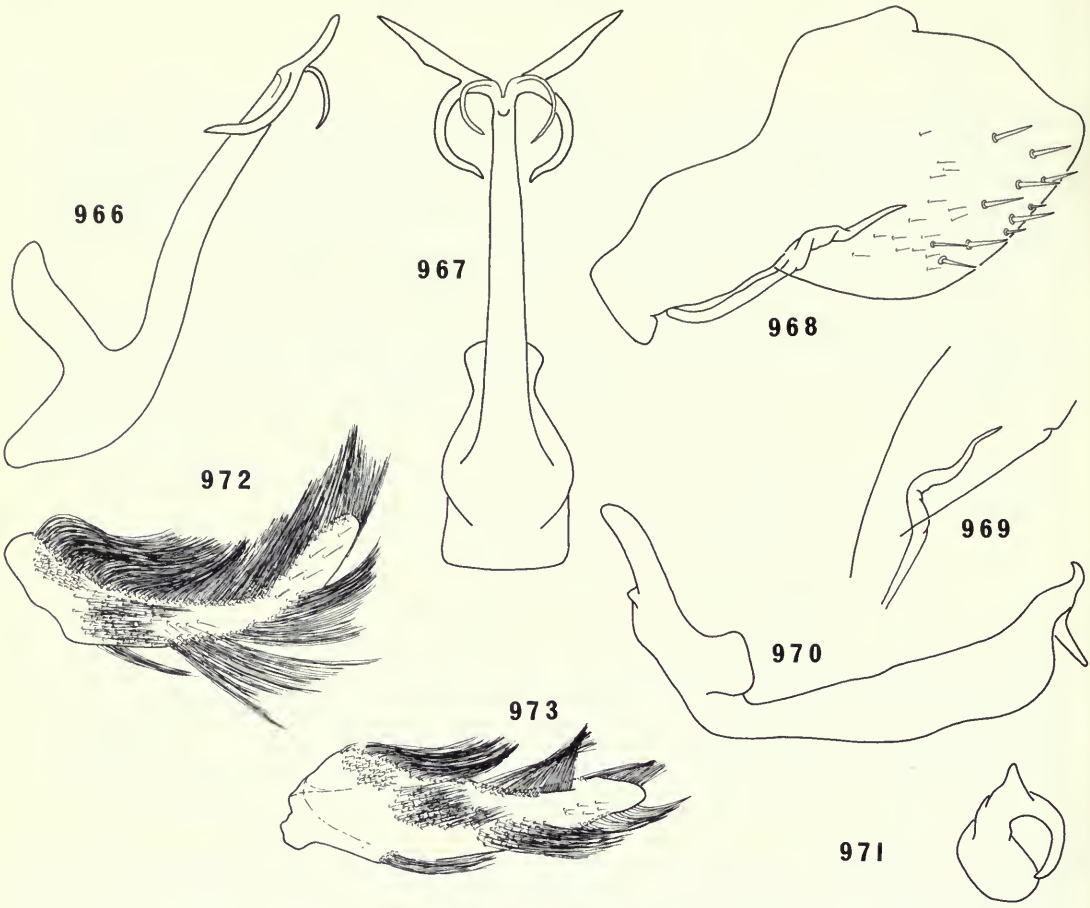
Batracomorphus telamon sp. n.

(Figs 966–973)

Length: ♂, 5·84 mm.

Vertex flattened.

Male genitalia. Pygophore processes short, slender, directed dorsoposteriorly, sinuate in posterior aspect, apex acute. Subgenital plates with basal stem and lobe indistinct; a dense multiseriate row of long hair-like setae along dorsal margin, distal half of ventral margin and distal region of medial margin; a group of shorter setae laterally just basad of midlength; a group of short spine-like setae laterally at base; a small isolated group of long hair-like setae medially near base. Styles with apical process expanding distally and narrowing abruptly subapically to acute dorsally hooked apex; an elongate heavily chitinised projection arising subapically on mesal margin and curving medially and then ventrally. Aedeagus with shaft slender, elongate, directed dorsally and turning posterodorsally, terminating in three pairs of elongate processes, a divergent dorsolaterally directed pair, a ventrally directed pair curving towards midline of shaft, and a shorter more slender similarly curving posterior pair; gonopore small, apical; anterior incision short.



Figs 966–973 *Batracomorphus telamon*. 966, 967, aedeagus; 968, pygophore; 969, left pygophore lobe and process, posterior view; 970, style; 971, same, posterior view; 972, left subgenital plate, left lateral view; 973, same, ventral view. (For further explanation see 'Techniques and methods'.)

Remarks. This species is closely related to *enyo* from New Guinea but differs in having three pairs of apical processes on the aedeagus instead of one, the gonopore much smaller, the apical process of the style abruptly narrowed subapically rather than at its midlength, and the head narrower rather than wider than the pronotum. Both species resemble *rhesus* from the Philippines and the *lavinia*-group from Borneo, New Guinea, New Britain and Australia in the presence of apical processes on the aedeagus but differ from all these in having the subgenital plates densely pubescent and without a distinct basal stem.

Material examined

Holotype ♂, **New Guinea**: Papua New Guinea, Madang District, Finisterre Mts, Damanti, 1082 m, 2–11.x.1964 (*M. E. Bacchus*) (BMNH).

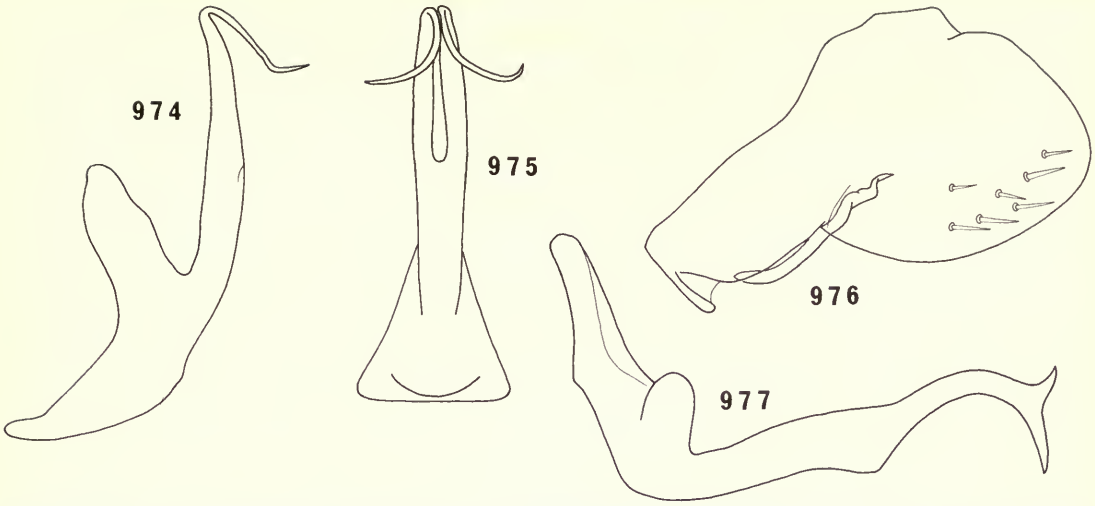
Batracomorphus enyo sp. n.

(Figs 974–977)

Length: ♂, 5·20 mm.

Head slightly wider than pronotum, vertex flattened.

Male genitalia. Pygophore processes very short, slender, membranous, sinuate, directed dorsoposteriorly, apex acute. Subgenital plates as in *telamon*. Styles with apical process of approximately uniform width to midlength then abruptly narrowed to more slender arched distal half, terminating in an acute



Figs 974–977 *Batracomorphus enyo*. 974, 975, aedeagus; 976, pygophore; 977, style. (For further explanation see 'Techniques and methods'.)

dorsally directed apex; an elongate ventrally directed dagger-like projection subapically on ventral margin. Aedeagus with shaft slender, directed dorsally, terminating in a pair of filamentous divergent processes directed ventrally approximately one-third length of shaft and with apices turned posteriorly; gonopore extending to near midlength of shaft; anterior incision very short.

REMARKS. This species is closely related to *telamon* from New Guinea but differs as described under that species. The resemblance between these two species and others in the genus is discussed under *telamon*.

MATERIAL EXAMINED

Holotype ♂, **New Guinea**: Papua New Guinea, Morobe District, Herzog Mts, Vagau, 1219 m, 4–17.i.1965 (*M. E. Bacchus*) (BMNH).

Nomina dubia

The following species, although congeneric, could not be adequately diagnosed owing to absence of authentically associated males or unavailability of type-specimen.

buxtoni (Osborn, 1934*a*: 168) (*Bythoscopus*). Holotype ♀, SAMOA: Upolu, Malololelei, 610 m, 25.xi.1924 (*P. A. Buxton & G. H. Hopkins*) (BMNH) [examined]. **Comb. n.**

citrinus (Evans, 1935: 76) (*Eurinoscopus*). Holotype ♀, AUSTRALIA: A.C.T., on *Casuarina*, 25.iii.1931 (*J. Evans*) (AM) [examined]. **Comb. n.**

coriaceus (Walker, 1870: 324) (*Jassus*). Holotype (abdomen missing), MYSOL (*Wallace*) (BMNH) [examined].

divergens (Schmidt, 1926, 253) (*Bythoscopus*). Type ♂, BURU: Station IX, 30.vi.1921 (depository unknown) [not examined]. **Comb. n.**

hyalinus (Osborn, 1934*a*: 169) (*Bythoscopus*). Holotype ♀, SAMOA: Tutuila, 366 m, 21.vii.1918 (*Kellers*) (depository unknown) [not examined]. **Comb. n.**

osborni (Metcalf, 1966: 74) (*Iassus*). [Unnecessary replacement name.]

laticeps (Osborn, 1934*a*: 168) (*Bythoscopus*). Holotype ♀, SAMOA: Tutuila, 274–366 m, centre of island, 30.vi.1918 (*Kellers*) (depository unknown) [not examined]. **Comb. n.**

maculipennis (Stål, 1870: 740) (*Macropsis*). Holotype ♀, PHILIPPINES: (NR) [examined]. **Comb. n.**

molestia (Kirkaldy, 1906: 348) (*Eurinoscopus*). Holotype ♀, AUSTRALIA: Queensland, Cairns, viii.1904 (BPBM) [examined].

montaguei (Distant, 1920: 467) (*Bythoscopus*). Holotype ♀, NEW CALEDONIA: Houadou, 30.x.1914 (*P. D. Montague*) (BMNH) [examined].

pallidus (Evans, 1935: 75) (*Eurinoscopus*). Holotype ♀, AUSTRALIA: Tasmania, Hobart (*Lea*) (AM) [examined].

pelamys (Kirkaldy, 1906: 349) (*Eurinoscopus*). Holotype ♀, AUSTRALIA: N.S.W., Sydney, i.1905 (*Koebele*) (BPBM) [examined].

pelias (Kirkaldy, 1906: 348) (*Eurinoscopus*). Holotype ♀, AUSTRALIA: N.S.W. (*Koebele*) (BPBM) [examined].

rex Blöte, 1964: 467 (*Batrachomorphus*). Holotype ♂ (abdomen missing), NEW GUINEA: Araboebivak, 4.x.1939 (RNH) [examined].

rubrofrontalis (Distant, 1908*b*: 192) (*Bythoscopus*). Type ♀, INDIA: Kotagiri (BMNH) [examined]. **Comb. n.**

soboles (Kirkaldy, 1906: 348) (*Eurinoscopus*). Holotype ♀, AUSTRALIA: Queensland, Cairns, viii.1904 (BPBM) [examined]. **Comb. n.**

sontiates (Kirkaldy, 1906: 347) (*Eurinoscopus*). Type ♀, AUSTRALIA: Queensland, Cairns, viii.1904 (BPBM) [examined].

tenuis Evans, 1972: 654 (*Batrachomorphus*). Holotype ♀, NEW GUINEA: Mt Kaindi, 2400 m, 27.i.1963 (*J. Sedlacek*) (BPBM) [not examined].

torensis Evans, 1972: 654 (*Batrachomorphus*). Holotype ♀, NEW GUINEA: River Tor (mouth), Maffen, 2.viii.1959 (*T. C. Maa*) (BPBM) [not examined].

translucidus (Evans, 1941: 145) (*Eurinoscopus*). Holotype ♀, AUSTRALIA: Western Australia, Dedari, 64 km W. of Coolgardie, 11–21.i.1936 (*R. E. Turner*) (BMNH) [examined].

tutuilanus (Osborn, 1934*a*: 166) (*Bythoscopus*). Holotype ♀, SAMOA: Tutuila, 326 m, eastern end of island, 21.vi.1918 (*Kellers*) (depository unknown) [not examined]. **Comb. n.**

viridipes (Distant, 1908*a*: 99) (*Bythoscopus*). Type ♀, AUSTRALIA: Queensland, Townsville, 14.v.1903 (*F. P. Dodd*) (BMNH) [examined].

viridis (Evans, 1935: 75) (*Eurinoscopus*). Type (abdomen missing), AUSTRALIA: Adelaide, 6.xii.1934 (*J. Evans*) (AM) [examined].

walkeri (Metcalf, 1966: 93) (*Iassus*). [Replacement name for *Bythoscopus unicolor* Walker, 1870: 320.] **Comb. n.**

unicolor (Walker, 1870: 320) (*Bythoscopus*). Type ♀, SULAWESI: Makasar (*Wallace*) (BMNH) [examined]. [Junior primary homonym of *Bythoscopus unicolor* Fitch, 1851.]

Nomen nudum

testaceus (Merino, 1936: 391) (*Bythoscopus*). This nomen nudum is included within *Batracomorphus* in view of the context in which it was originally cited.

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J. N. Eliot and A. Kawazoé

The most wide-spread member of the *Lycaenopsis*-group is known and loved in Britain as the Holly Blue, in North America as the Spring Azure and in Japan as Ruri Shijimi (the Small Lapis Lazuli). In appearance and behaviour it is typical of the group, which attains its maximum diversity and abundance in the mountains of South East Asia and New Guinea. Hitherto the systematics of the group have been in a state of confusion. In this work 112 species are recognised divided among 21 genera. These are defined mainly on characters of the genitalia, which are figured for the males of each, and the females of most, species. There are keys to, and descriptions of, the genera, subgenera, species and subspecies, including 8 new genera and 27 new species. The new species and those not previously figured are illustrated in the plates at the rear of the book, and references are given to published figures of the remaining species. Finally, there is a complete bibliography, enabling the original descriptions of all the taxa to be traced.

John Eliot is the author of many papers of a taxonomic nature and was the reviser of the third edition of Corbet & Pendlebury's classic work "The Butterflies of the Malay Peninsula" first published half a century ago. His contribution to zoology has been recognised by the presentation of the Stamford Raffles Award of the Zoological Society of London and the J. H. Bloomer Award of the Linnean Society of London.

Akito Kawazoé has published many taxonomic papers, mainly in Japanese journals, and is best known in Europe as the senior author of "Coloured Illustrations of the Butterflies of Japan", a work notable not only for its superb coloured plates but also for numerous black and white drawings illustrating structural characters. His skill as artist and microscopist is again demonstrated in this book by more than two hundred figures of genitalia which will prove indispensable to a proper understanding of the *Lycaenopsis*-group.

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The Afrotropical idiocerine leafhoppers (Homoptera: Cicadellidae)

M. D. Webb

Entomology series
Vol 47 No 3

29 December 1983

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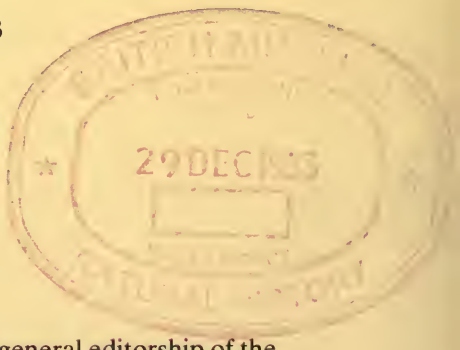

The Entomology series is produced under the general editorship of the
Keeper of Entomology: Laurence A. Mound
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Entomology series
Vol 47 No 3 pp 211–257

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The Afrotropical idiocerine leafhoppers (Homoptera: Cicadellidae)

M. D. Webb

Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD

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Synopsis

The subfamily Idiocerinae is described and a key is provided to the 13 genera (11 new) occurring in the Afrotropical region. Keys and descriptions, or references to descriptions, are given for the 63 species (18 new) from the region. One new genus from Aldabra is described. A check-list is provided summarizing the nomenclatural changes, which include one new specific synonymy and 41 new combinations. The characters used to separate taxa are discussed and the dissimilarity values between pairs of genera are tabulated.

Bull. Br. Mus. nat. Hist. (Ent.) **47** (3): 211–257 Issued 29 December 1983

Introduction

The Idiocerinae is a moderately large group of arboreal leafhoppers, containing approximately 400 known species. Members of the subfamily range in size from 3–10 mm and are recognizable by their short, broad heads, giving them a narrow, wedge-shaped appearance. The group is cosmopolitan, but the greatest number of species has been recorded from the Holarctic region (approximately 200 species) and Australia (105 species). Other regions, except the Afrotropical region, remain virtually unworked, apart from biological studies on some species of economic importance in the Oriental region (see below).

At the generic level, revisionary works on the Idiocerinae are available for the Palaearctic region (Dlabola, 1974), the Nearctic region (excepting the Sonoran subregion) (Hamilton, 1980) and Australia (Webb, 1983). Dlabola (1974) placed the Palaearctic idiocerine species into 14 genera (six new), and Ossiannilsson (1981) added a further two new genera. The Nearctic fauna was found by Hamilton (1980) to be composed of nine of the genera recognized by Dlabola, but as many intermediates were found between these genera, Hamilton recognized only three in the Nearctic region. The Australian fauna (Webb, 1983) includes 27 idiocerine genera, the majority of which are endemic. Compared to the above faunas the idiocerine fauna of the Afrotropical region (13 genera and 63 species) is fairly small, although there are doubtless many more taxa still to be described, including two new genera represented in the BMNH but not included here (see below). The majority of species from this region were treated previously (Webb, 1975; 1976) and tentatively placed in species-groups of known genera until further material became available for study. The objective of the present work is to reassess these species, together with much new material, and apply generic concepts similar to those used in the papers referred to above.

The characters used in this study have mainly confirmed previous groupings of species, although these are here treated as separate genera. By using these characters for species in other areas, particularly for the Nearctic species of *Idiocerus* Lewis and the Oriental species of *Idioscopus* Baker, it should be possible to devise a more meaningful classification for the faunas of those areas. The classification for the Nearctic fauna proposed by Hamilton (1980), who used fewer characters, may suggest too close a relationship with the Palaearctic fauna (see 'External characters', p. 214). A few species are common to both the Nearctic and Palaearctic regions. Moreover, the species of Hamilton's *Idiocerus productus*-group bear a striking resemblance to the Palaearctic species treated in *Metidiocerus* by Ossiannilsson (1981) although Hamilton placed these in his *I. vittifrons*-group.

The Afrotropical fauna consists of 13 genera and 63 species which are all endemic except for *Kopamerra haupti* (also found in Madagascar) and *Chunra* (also found in Indonesia and Australia). A single genus and species endemic to Aldabra (off the east coast of Africa) is included below as the cicadellid fauna of this area is closely related to that of Africa (Webb, 1980: 829). Two new genera from central Africa are not included as they are represented only by females in the BMNH. These show two unusual features for the African region (see 'External characters', p. 213). The Idiocerinae of Madagascar described by Freytag & Knight (1966) require a similar revisionary treatment to that undertaken here. The monobasic genus *Strongylomma* Spinola, with type-species *caffra* Spinola, was incorrectly recorded by Spinola from South Africa. Although the type of *caffra* (MRSN) is without data a single specimen in the BMNH shows this genus and species to be from South America.

In the Holarctic region idiocerines feed and breed on a wide variety of trees, particularly Salicaceae, and on some shrubs (Hamilton, 1980; Le Quesne, 1965), and they have been recorded in Australia from *Eucalyptus* and *Melaleuca* (Myrtaceae) (Webb, 1983). In India they are found as pests on Mango (*Mangifera indica*) (Anacardiaceae), and have been recorded on *Semecarpus anacardium* (Anacardiaceae) and *Syzygium cumini* (Myrtaceae) (Viraktamath, 1973, 1976). In Africa the following hosts have been recorded: *Rhus* species (Anacardiaceae), *Haplocoelum foliolosum* (Sapindaceae), *Mimusops zeyheri* (Sapotaceae), *Diospyros mespiliformis* (Ebenaceae), *Colophospermum mopane* (Leguminosae), and *Commiphora africana* (Burseraceae).

In common with other cicadellids, idiocerines can affect the growth of plants if they occur in sufficient numbers, by sucking nutrients and chlorophyll from foliage and by damaging stems during egg laying. This has been observed mainly for the economically important species of Idiocerinae, which occur on Mango in the Oriental region. In addition, by excreting honey dew, these insects are responsible for the large scale growth of sooty mould on Mango (Serrano & Palo, 1933; Ahmed *et al.*, 1981). Damage to *Pistacia vera* by *Sulamicerus stali* (Fieber) in Turkey, resulting in fruit loss (up to 30–40 per cent in drought years), is caused by direct feeding and by the excretion of honey dew (Lodos & Kalkandelen, 1982). One member of the subfamily, *Idiocerus populi* (Linnaeus), has been recorded as a vector of an unknown organism that produces witches' broom disease on Poplar (Meer, 1981).

Materials and methods

Explanatory comments on the format adopted

In the absence of any subdivisions of the subfamily the genera are arranged into two 'convenience' groups based on the number of spines at the apex of the hind femur (2+0 or 2+1) (Webb, 1975; 1976).

For each generic and specific entry a description or reference to a description is given. Full collecting data are given only for type-material of new species.

Corresponding parts of different species are not necessarily figured to the same scale. In the male genitalia of any one species the same scale is used for the aedeagus and complete style.

Unless otherwise stated, structures are figured in the following aspects: head and thorax (dorsal); ovipositor valvulae, male genital capsule, male pygophore, subgenital plate and style (left lateral); aedeagus (left lateral, Fig. 12 or posterior, Fig. 13).

Examination of the male and female genitalia

The male and female genitalia were examined in glycerine, having previously been macerated in warmed KOH and thoroughly washed in distilled water. The second valvulae of the ovipositor were examined after separation from the first valvulae; this was accomplished by pushing the second valvulae posteriorly while holding the bases of the first valvulae. To avoid dislodging the third valvulae during this operation it was often necessary to break the ramal bases of the second valvulae prior to pushing.

Taxonomic characters used

The taxonomic characters used are similar to those employed in previous work (Webb, 1983 and Maldonado Capriles, 1977). The characters used to separate genera are listed below together with a table giving each character state for each of the African genera. Of the 46 characters used 28 are external, 17 are of the male or female genitalia and one is a character of the male basal abdominal apodemes. No new characters were found.

External characters. Of the 28 external characters used to separate genera, 16 are of the head, three the thorax, four the forewings and five the hind legs. Two characters, the concave lateral margins of the clypellus and the flattened hind tibia, are present in all the African genera and are therefore omitted from the list of generic characters below. Two other external characters omitted from this list are the width of the clypellus and the size of the lora. In all the genera described here the clypellus is narrow and the lora are large. However, in the two undescribed African genera referred to in the introduction, one has the clypellus broad, the other has the lora small.

Colour pattern. This is a very useful character by which to separate and group species and, to a less extent, genera. To separate the latter I have used two characters, including the presence or absence of a brown spot on the vertex near to each eye (character 2 below). Four Nearctic species were shown by Hamilton (1980) to be sexually dimorphic in this character, but in the African species this dimorphism occurs only in *Yachandra projecta*. Both states of this character are found in *Pandacerus* and *Pretioscopus*. One other character used to separate *Chunra* and

Hensleyella are the brown markings on the subcostal area of the forewing. Distinctive colour patterns are found in several species and species-groups, e.g. the orange transverse bands on the head and pronotum in the *Kopamerra haupti*-group and the presence or absence of a pair of spots on the head and pronotum and the colour of the first valvulae in *Pretioscopus*.

Other external characters. Apart from colour most other external characters are mainly of generic importance. The broad lora in *Theronopus* are unique for the subfamily and the following characters are unique for genera in the region: the indistinct laterofrontal sutures in *Quartauropa,* the distinctly incurved laterofrontal sutures and long rostrum in *Chunra* and the transversely striate pronotum in *Cafixia*. In *Rotifunkia* and *Hensleyella* the vertex is distinctly visible above the eye in facial aspect (Fig. 39), resulting from the very short vertex and small eyes in these genera. The number of spines at the apex of the hind femur (2+0 or 2+1) (character 24) is constant within each genus except *Theronopus* (see remarks under that genus). The previously confusing situation within the Palaearctic genus *Idiocerus*, where both 2+0 and 2+1 spines were present (Webb, 1976: 292), has now been resolved. In 1974 Dlabola erected three Palaearctic genera (*Viridicerus, Taeniocerus* and *Sulamicerus*) for five species of *Idiocerus*; these species all have 2+1 spines which confirms Dlabola's decision to separate them from *Idiocerus*, which has 2+0 spines. Genera with 2+0 spines and those with 2+1 spines are found in approximately equal numbers in the Old World but all genera from the New World have 2+0 spines (except *Strongylomma* Spinola which has a small ventral rather than dorsal subapical spine). The Nearctic species *Idiocerus couleanus* Ball & Parker (with 2+0 spines) was placed in the *I. ustulatus*-group by Hamilton (1980) but probably does not belong here as *ustulatus* Mulsant & Rey belongs to *Viridicerus* with 2+1 spines. The number of spines in rows 1–3 of the hind tibia (characters 26–28) are listed under three character states for each row. These characters are used despite considerable overlap in some genera, because a few genera have consistently high or low numbers of spines present. Reference to the distal spines of row 2, with basal process strong, weak or absent (character 25), does not include the spine in the apical pecten opposite this row, where the basal process is always present.

Male basal abdominal apodemes. The male basal abdominal apodemes have not been used to distinguish species, but in *Kopamerra* and *Rotifunkia* the dorsal pair of apodemes are strut-like rather than lobe-like as in other Idiocerinae.

Male genitalia. Characters of both generic and specific importance are found in all the principal structures of the male genitalia. Thirteen characters, listed below, are used to separate genera. The two dorsal keels of the connective in *Yachandra* are unique for the subfamily, and the following characters are unique to the region: processes of the basal apodeme of the aedeagus in *Hensleyella*, the produced dorsoposterior corners of the pygophore in *Yachandra,* the spine-like marginal setae of the subgenital plate in *Rotifunkia,* the absence of dorsal marginal setae in *Quartauropa,* and the apically expanded styles in *Pandacerus*. The basal apodeme of the aedeagus is present in all genera from the region in contrast to some of those from the Oriental and Australian regions where it is absent.

Female genitalia. In the female genitalia characters of generic and specific importance are found mainly on the second valvulae of the ovipositor (see generic characters 44–46). The length of the dorsal sclerotized region and the toothed portion of the second valvulae are of specific importance in several genera. The dorsal sclerotized region is situated basally at the dorsal margin of the valvulae except in most species of *Pretioscopus* where it is situated below the dorsal margin. Its position corresponds to the fused region of the paired valvulae, and its posterior limit at the dorsal margin is usually near the first dorsal tooth; in some genera separated from this tooth by a dorsal hyaline region (Fig. 113). The length of the expanded apex of the first valvulae is used to separate species of *Pretioscopus* (Figs 118, 119) and the dorsally imbricate, rather than transversely striate, third valvulae is found only in *Chunra* and one other genus from NE. Australia (*Candulifera* Webb).

Below is a list of 46 characters and their states which have been used to separate genera and to construct Table 1. For ease of reference in Table 1 the letter 'B' is used for the most commonly

found state of a given character among the 14 genera. In consequence some character states differ in the sequence of listing, e.g. (A) strong; (B) absent; (C) weak for character 25 and (A) absent; (B) distal; (C) basal for character 41. Five characters for *Hensleyella* (16 and 43–46) were not available for study (indicated by (?) in Table 1) and are therefore not included in the dissimilarity values for this genus in Table 2.

1. Head width. Head width divided by pronotum width (A) 1·00–1·09; (B) 1·10–1·19; (C) 1·20–1·27.
2. Presence of spot on vertex near each eye. Spots (A) present; (B) absent.
3. Length of vertex. Medial length of vertex (A) greater than; (B) equal to; (C) less than length of vertex next to eyes.
4. Width of vertex. Width of vertex divided by medial length of vertex (A) 7·5–8·5; (B) 3·5–8·0.
5. Visibility of vertex in facial aspect. Vertex (A) visible; (B) not visible above eye.
6. Microsculpture of vertex. Vertex (A) transversely striate; (B) shagreened.
7. Width of face. Face width (A) equalling or less than face length; (B) greater than face length.
8. Spine-like setae on facial margin close to eye. (A) one or two setae present; (B) setae absent.
9. Size of eye. Length of inner margin of eye divided by perpendicular length of face below eye (A) 0·62–0·77; (B) 0·83–1·10.
10. Position of ocelli. Interocellar width divided by ocellocular width (A) 1·0–1·7; (B) 2·0–2·7; (C) 3·3–3·5.
11. Presence and length of laterofrontal sutures. Sutures (A) reaching ocelli; (B) not reaching ocelli; (C) absent.
12. Curvature of laterofrontal sutures. Sutures (A) distinctly incurved; (B) not distinctly incurved or absent.
13. Apical expansion of male antennae. Antennae (A) expanded; (B) not expanded apically.
14. Width of lora. Lora (A) extending to facial margin throughout length; (B) separated from facial margin throughout; (C) extending to facial margin over ventral one-fifth to one-third.
15. Shape of clypellus. Clypellus (A) with greatest width at base; (B) with greatest width at apex; (C) equal in width at base and apex.
16. Length of rostrum. Rostrum extended (A) beyond hind coxae; (B) to mid or hind coxae.
17. Pronotal microsculpture. Pronotum (A) transversely striate; (B) shagreened.
18. Length of scutellum. Length of scutellum (A) greater than; (B) less than or equalling combined length of pronotum and vertex.
19. Scutellar microsculpture. Scutellum (A) rugose; (B) shagreened.
20. Colour pattern of forewing. Subcotal region (A) with; (B) without brown spots.
21. Closure of first subapical cell of forewing. First subapical cell (A) closed; (B) open.
22. Closure of second subapical cell of forewing. Second subapical cell (A) open; (B) closed.
23. Presence of third subapical cell of forewing. Third subapical cell (A) present; (B) absent.
24. Setal formula at apex of hind femur. Setal formula (A) 2+0; (B) 2+1.
25. Presence and size of basal process of distal spines of hind tibia. Basal processes (A) strong; (B) absent; (C) weak.
26. Number of spines in row 1 of hind tibia. Number of spines (A) 3–9; (B) 11–19; (C) 20–26.
27. Number of spines in row 2 of hind tibia. Number of spines (A) 3–5; (B) 6–7; (C) 8–9.
28. Number of spines in row 3 of hind tibia. Number of spines (A) 3–5; (B) 6–9; (C) 10–13.
29. Shape of male basal dorsal abdominal apodemes. Apodemes (A) strut-like; (B) lobe-like.
30. Shape of dorsoposterior angles of pygophore. Angles (A) produced; (B) not produced.
31. Presence of a small protuberance on posterior margins of male pygophore. Protuberance (A) present; (B) absent.
32. Presence and length of dorsolateral fold of male pygophore. Dorsolateral fold (A) long; (B) short or absent.
33. Presence of anterior transverse region of male Xth segment. Transverse region (A) present; (B) absent.
34. Attachment of male Xth segment to pygophore. Xth segment (A) loosely (membranously) attached to pygophore; (B) solidly attached to pygophore (with a suture between); (C) fused to pygophore (without a suture between).
35. Presence and length of ventral arms of male Xth segment. Ventral arms (A) long; (B) short or absent.
36. Form of marginal setae of subgenital plates. Setae (A) spine-like; (B) fine.
37. Presence of dorsal marginal setae of subgenital plates. Dorsal setae (A) absent; (B) present.
38. Form of apical process of style. Apical process (A) expanded (Fig. 110); (B) tapered or foot-like (Fig. 86).

Table 1 Distribution of character states for 46 characters of African Idiocerinae genera. The letters represent the character states of the numbered characters on the left which are detailed in the text.

	GENERA													
CHARACTERS	*Kopamerra*	*Rotifunkia*	*Chunra*	*Hensleyella*	*Maldonadora*	*Yachandra*	*Theronopus*	*Pandacerus*	*Pretioscopus*	*Grootonia*	*Cafixia*	*Rhusopus*	*Quartauropa*	*Remoya*
1	B	AB	AB	A	C	BC	BC	BC	B	B	C	C	B	B
2	B	B	B	B	A	A	A	AB	AB	A	A	A	B	B
3	B	BC	ABC	C	C	C	BC	ABC	AB	C	AB	BC	B	AB
4	B	AB	B	A	B	B	B	B	B	B	B	B	B	B
5	B	A	B	A	B	B	B	B	B	B	B	B	B	B
6	B	B	B	B	B	B	B	B	AB	B	A	A	B	A
7	B	B	A	A	B	B	B	B	B	B	B	B	B	B
8	B	B	A	B	A	B	B	B	B	B	B	B	B	B
9	B	A	B	A	B	B	B	B	B	B	B	B	A	B
10	B	B	A	A	A	B	B	B	B	B	C	B	B	C
11	A	B	A	B	B	B	B	B	B	A	B	B	C	B
12	B	B	A	B	B	B	B	B	B	B	B	B	B	B
13	B	B	B	B	B	B	B	A	AB	B	B	B	B	B
14	B	B	B	B	B	C	A	B	B	B	B	B	B	B
15	A C	A C	B	B	B	C	B	B	B	B	B	B	B	B
16	B	B	A	?	B	B	B	B	B	B	B	B	B	B
17	B	B	B	B	B	B	B	B	B	B	A	B	B	B
18	B	B	AB	A	B	B	B	B	B	B	B	B	B	B
19	B	B	B	B	B	B	B	B	B	B	A	B	A	B
20	B	B	A	A	B	B	B	B	B	B	B	B	B	B
21	B	B	B	B	B	B	B	B	A	B	B	B	A	B
22	B	B	B	B	B	B	B	B	B	B	B	B	B	A
23	B	B	B	B	B	B	B	B	B	B	B	B	A	A
24	A	A	A	A	A	A	AB	B	B	B	B	B	B	B
25	A	C	B	B	B	B	C	B	B	B	A	C	C	B
26	B	AB	C	B	B	A	BC	B	B	BC	B	AB	B	B
27	AB	A	B	A	B	AB	AB	B	B	BC	B	A	BC	B
28	AB	A	C	AB	B	A	AB	B	AB	B	B	A	B	A
29	A	A	B	B	B	B	B	B	B	B	B	B	B	B
30	B	B	B	B	B	A	B	B	B	B	B	B	B	B
31	A	A	B	B	B	B	B	B	B	B	B	B	B	B
32	B	B	A	A	A	B	B	B	B	B	B	B	B	B
33	B	B	B	B	B	B	B	B	B	A	B	B	A	B
34	A	C	B	B	A	B	ABC	A	A	B	A	C	B	B
35	B	B	A	B	A	B	B	B	B	B	B	B	B	B
36	B	A	B	B	B	B	B	B	B	B	B	B	B	B
37	B	B	B	B	B	B	B	B	B	B	B	B	A	B
38	B	B	B	B	B	B	B	A	B	B	B	B	B	B
39	B	B	B	B	B	B	B	A	A	B	B	A	A	A
40	B	B	B	B	B	A	B	B	B	B	B	B	B	B
41	B	B	A	A	A	C	AB	B	AB	B	B	B	A	C
42	B	B	B	A	B	B	B	B	B	B	B	B	B	B
43	B	B	A	?	B	B	B	B	B	B	B	B	B	B
44	B	B	A	?	B	B	B	B	B	B	B	B	B	B
45	B	B	B	?	B	B	B	B	B	A	B	B	B	B
46	B	B	B	?	B	A	AB	A	AB	A	B	A	A	B

39. Position of preapical lobe of style. Preapical lobe (A) lateral; (B) ventral or absent.
40. Number of dorsomedial keels of connective. Connective with (A) two keels; (B) one keel.
41. Presence and position of lateral processes of aedeagal shaft. Aedeagus with lateral processes (A) absent; (B) distal; (C) basal.
42. Presence of processes of basal apodeme of aedeagus. Basal apodeme of aedeagus (A) with; (B) without processes.
43. Dorsal microsculpture of first valvulae. First valvulae (A) imbricate; (B) transversely striate dorsally.
44. Shape of second valvulae. Second vulvulae (A) narrowed distally (Fig. 31); (B) not narrowed distally.
45. Denticulation of second valvulae. Second valvulae (A) with numerous very fine teeth (Fig. 131); (B) without numerous very fine teeth.
46. Presence of dorsal hyaline region of second valvulae. Second valvulae (A) with; (B) without dorsal hyaline region.

The 46 characters noted above are listed in Table 1, together with the character state(s) present for each genus. From this table the numbers of differences (dissimilarity value) between pairs of genera were calculated (Table 2), and it is therefore possible to see which genera are 'least dissimilar', e.g. *Pandacerus* and *Pretioscopus* (differing in only two characters) and which genera are 'most dissimilar', e.g. *Chunra* and *Rotifunkia* (differing in 23 characters). Also *Chunra* and *Hensleyella* have consistently high values, except between each other, suggesting that they can be grouped apart from the remainder. The order of the genera in the Tables corresponds to the two 'convenience' groups noted above, i.e. those genera from *Kopamerra* to *Theronopus* (in part) have 2+0 spines at the apex of the hind tibia and those from *Theronopus* (in part) to *Quartauropa* have 2+1 spines (see character 24 above).

Table 2 Dissimilarity values between all pairs of African idiocerine genera (taken from Table 1). The higher the number the more 'dissimilar' are the genera compared.

	Remoya	*Quartauropa*	*Rhusopus*	*Cafixia*	*Grootonia*	*Pretioscopus*	*Pandacerus*	*Theronopus*	*Yachandra*	*Maldonadora*	*Hensleyella*	*Chunra*	*Rotifunkia*
Quartauropa	14												
Rhusopus	11	15											
Cafixia	12	17	9										
Grootonia	15	12	10	12									
Pretioscopus	7	8	5	8	7								
Pandacerus	11	12	7	9	7	2							
Theronopus	10	10	3	6	6	4	5						
Yachandra	15	19	10	16	11	11	11	7					
Maldonadora	16	19	13	11	11	9	10	6	13				
**Hensleyella*	16	20	16	19	15	16	17	13	17	12			
Chunra	18	22	23	22	17	17	20	14	20	13	11		
Rotifunkia	17	18	12	17	16	12	15	8	12	17	12	23	
Kopamerra	12	16	11	11	10	7	10	7	13	13	17	18	6

* see remarks above (p. 215).

Abbreviations of depositories

AM	Albany Museum, Grahamstown, South Africa.
AMNH	American Museum of Natural History, New York, U.S.A.
BMNH	British Museum (Natural History), London, U.K.
CAS	California Academy of Sciences, San Francisco, U.S.A.
IRSNB	Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium.
MD	Museu do Dundo, Lunda, Angola.
MM	Moravian Museum, Brno, Czechoslovakia.

MNHN	Muséum National d'Histoire Naturelle, Paris, France.
MRAC	Musée Royal de l'Afrique Centrale, Tervuren, Belgium.
MRSN	Museo Regionale di Scienze Naturali, Turin, Italy.
MZE	Museum of Zoology and Entomology, Lund University, Lund, Sweden.
NCI	National Collection of Insects, Pretoria, South Africa.
PPRI	Plant Protection Research Institute, Pretoria, South Africa.
RL	Private collection of Dr R. Linnavuori, Raisio, Finland.
SAM	South African Museum, Cape Town, South Africa.
SM	State Museum, Windhoek, South West Africa.
SMNS	Staatliches Museum für Naturkunde in Stuttgart, Ludwigsburg, West Germany.
TM	Transvaal Museum, Pretoria, South Africa.
UK	University of Kentucky, Lexington, U.S.A.
US	University of Stellenbosch, Stellenbosch, South Africa.
USNM	U.S. National Museum of Natural History, Washington, D.C., U.S.A.

Acknowledgements

For the loan of material in their care I thank Dr P. Arnaud, CAS; Dr M. Boulard, MNHN; Dr A. Casale, MRSN; Dr R. Danielsson, MZE; Dr P. Dessart, IRSNB; Dr P. Freytag, UK; Dr F. W. Gess, AM; Dr F. Heller, SMNS; Dr J. Kramer, USNM; Dr P. Lauterer, MM; Dr M.-L. Penrith, SM; Dr G. Schmitz, MRAC; Dr R. T. Schuh, AMNH; Dr J. G. Theron, US. I also thank Dr C. Vidano, Dr J. Van Stalle and Dr Theron for their help in obtaining specimens, and Dr R. Linnavuori for lending material from his private collection.

Check-list of the Afrotropical Idiocerinae

IDIOCERINAE Baker, 1915
- ***CAFIXIA*** **gen. n.**
  - ***hewitti*** Cogan, 1916
- ***CHUNRA*** Distant, 1907
  - ***doarna*** **sp. n.**
  - ***olandea*** **sp. n.**
  - ***villa*** **sp. n.**
- ***GROOTONIA*** **gen. n.**
  - ***kenyaensis*** (Webb, 1976) **comb. n.**
  - ***knighti*** (Webb, 1976) **comb. n.**
  - ***mella*** **sp. n.**
- ***HENSLEYELLA*** **gen. n.**
  - ***ipoa*** **sp. n.**
- ***KOPAMERRA*** **gen. n.**
  - ***bifurcata*** (Webb, 1975) **comb. n.**
  - ***dentata*** **sp. n.**
  - ***divergens*** (Webb, 1975) **comb. n.**
  - ***haupti*** (Melichar, 1908) **comb. n.**
    - *exus* (Freytag & Knight, 1966) **syn. n.**
  - ***sparsa*** (Webb, 1975) **comb. n.**
  - ***truncata*** (Webb, 1975) **comb. n.**
- ***MALDONADORA*** **gen. n.**
  - ***rixia*** **sp. n.**
- ***PANDACERUS*** **gen. n.**
  - ***aethiopicus*** (Webb, 1976) **comb. n.**
  - ***capeneri*** **sp. n.**
  - ***flavicostus*** (Webb, 1976) **comb. n.**
  - ***sinuatus*** (Webb, 1976) **comb. n.**
  - ***scotti*** (Distant, 1917) **comb. n.**
- ***PRETIOSCOPUS*** **gen. n.**
  - ***africanus*** (Webb, 1976) **comb. n.**
  - ***binotatus*** (Webb, 1976) **comb. n.**
  - ***caprilei*** (Webb, 1976) **comb. n.**
  - ***flavocephalus*** (Webb, 1976) **comb. n.**
  - ***flavosignatus*** (Webb, 1976) **comb. n.**
  - ***ghanaensis*** (Webb, 1976) **comb. n.**
  - ***linnavuorii*** (Webb, 1976) **comb. n.**
  - ***longicornis*** **sp. n.**
  - ***macrosetus*** (Webb, 1976) **comb. n.**
  - ***medleri*** (Webb, 1976) **comb. n.**
  - ***nigeriensis*** (Webb, 1976)**comb. n.**
  - ***pilosus*** (Webb, 1976) **comb. n.**
  - ***quadrimaculatus*** (Webb, 1976) **comb. n.**
  - ***viridiclavus*** (Webb, 1976) **comb. n.**
- ***QUARTAUROPA*** **gen. n.**
  - ***nigrocella*** (Webb, 1976) **comb. n.**
- ***REMOYA*** **gen. n.**
  - ***aldabraensis*** (Webb, 1976) **comb. n.**
- ***RHUSOPUS*** **gen. n.**
  - ***aliwalensis*** (Webb, 1976) **comb. n.**
  - ***cuneiformis*** (Naudé, 1926) **comb. n.**
  - ***gonubiensis*** **sp. n.**
  - ***hardua*** **sp. n.**
  - ***turneri*** (Webb, 1976) **comb. n.**
- ***ROTIFUNKIA*** China, 1926
  - ***agallioides*** (Maldonado, 1971)
  - ***guttifera*** (Walker, 1851)
- ***THERONOPUS*** **gen. n.**
  - ***aethiopicus*** (Heller & Linnavuori, 1968) **comb. n.**
  - ***alargus*** **sp. n.**
  - ***angulatus*** (Webb, 1975) **comb. n.**
  - ***bicornis*** **sp. n.**
  - ***bifidus*** **sp. n.**
  - ***citrinus*** (Melichar, 1914) **comb. n.**
  - ***harpago*** (Heller & Linnavuori, 1968) **comb. n.**

Check-list of the Afrotropical Idiocerinae – cont.

lobatus (Webb, 1975) **comb. n.**
loratus (Webb, 1976)
mimicus (Webb, 1976)
mopanei (Webb, 1976) **comb. n.**
***mtitoensis* sp. n.**
ohopohoensis (Linnavuori, 1961) **comb. n.**
quadriocellatus (Melichar, 1908) **comb. n.**
robustus (Webb, 1976) **comb. n.**
serratus (Webb, 1975) **comb. n.**
spicatus (Webb, 1976) **comb. n.**
***tanzaniaensis* sp. n.**
***tsavoensis* sp. n.**
***YACHANDRA* gen. n.**
projecta (Webb, 1975) **comb. n.**
***torana* sp. n.**

Nomen dubium
Idiocerus funereus Melichar, 1911.

IDIOCERINAE Baker

Idiocerini Baker, 1915: 317. Type-genus: *Idiocerus* Lewis.
Idiocerinae Baker; Evans, 1934: 149

Small to moderately large, wedge-shaped leaf-hoppers. Yellow, brownish or greenish yellow, with or without brown or scarlet markings, often with a small brown spot on vertex near to each eye and brown basal triangles to scutellum.

Head wider than pronotum, rarely equal in width (*Hensleyella* and *Hatralixia* Webb). Vertex short and broad, of uniform or near uniform length; evenly rounded to face, rarely angularly rounded (*Theronopus mimicus*). Face distinctly wider to slightly narrower than length; ocelli on face, rarely visible dorsally (*Tumocerus* Evans); antennae moderately long, sometimes expanded apically in male; lora usually narrow, rarely extended to facial margin over ventral one-fifth to one-third (*Yachandra*) or over entire length (*Theronopus*), outer margin sometimes elevated; clypellus usually wider apically with sides concave. Hind femur with apical setal formula 2+0 or 2+1. Hind tibia flattened or square-shaped in cross section. Forewings with two or three subapical cells and four apical cells; appendix broad.

Male abdomen with a pair of lobe-like basal apodemes from third sternite and a pair of lobe or strut-like basal apodemes from third tergite.

Male genitalia with pygophore with or without a dorsolateral vertical fold or posterior processes; vertical ventrolateral folds absent. Valve usually fused to pygophore. Tenth segment collar-like, with or without a pair of ventrolateral arms or posterior processes; sometimes fused to pygophore anteriorly. Subgenital plates usually long, often spatulate in lateral aspect and usually with a marginal series of long fine setae distally. Styles with a single basal apodeme; apical process short to long; with or without a preapical lobe. Connective 'Y'-shaped, articulated with aedeagus, rarely fused; stem short with a dorsomedial keel or a pair of dorsolateral keels (*Yachandra*). Aedeagus with or without a dorsally directed basal apodeme, if absent aedeagus with a basal stem (preatrium) and sometimes lateral apophyses; shaft cylindrical or laterally compressed, with or without processes; gonopore apical or subapical on posterior surface.

Female genitalia with first valvulae transversely striate dorsolaterally, rarely imbricate (*Chunra* and *Candulifera*).

DISTRIBUTION. Cosmopolitan.

REMARKS. The Idiocerinae are a very uniform group of leaf-hoppers which can be distinguished by the following combination of characters: head short, as wide or wider than pronotum, ocelli on the face, antennae moderately long, forewing with broad appendix and male genitalia with pygophore without vertical ventrolateral folds, valve usually fused to pygophore and styli with a single basal apodeme. The group can be distinguished from the similar Macropsinae and Agalliinae by the broad appendix of the forewing and from the similar Eurymelinae by the moderately long rather than short antennae and the aedeagus being attached to the connective rather than disassociated from it.

Key to the Afrotropical genera of Idiocerinae

1 Vertex with a dark brown spot near to each eye (Fig. 45) 9
– Vertex not as above, sometimes mottled with brown 2
2 Face longer than wide with laterofrontal sutures long and distinctly incurved (Fig. 26)
CHUNRA Distant (p. 225)
– Face wider than long or if as above, then laterofrontal sutures short and more or less straight 3

3 Eyes small, inner margin of eye in facial aspect 0·62–0·77 times perpendicular length of face below eye (Figs 23, 39) 4
– Eyes moderately large, inner margin of eye in facial aspect 0·83–1·10 times perpendicular length of face below eye (Figs 1, 26) 6
4 Dark brown with some yellow markings at least laterally on face (Fig. 23) ***ROTIFUNKIA*** China (p. 224)
– Not as above 5
5 Yellow, finely and densely mottled with brown (Fig. 38) ..... ***HENSLEYELLA*** gen. n. (p. 227)
– Not as above ..... ***QUARTAUROPA*** gen. n. (p. 252)
6 Head either yellow with orange transverse bands or yellow mottled with brown ***KOPAMERRA*** gen. n. (p. 220)
– Head yellow or mainly dark brown 7
7 Face slightly longer than wide or equal in width to length ..... ***REMOYA*** gen. n. (p. 254)
– Face wider than long 8
8 First subapical cell of forewing closed (Fig. 116). Apex of style acute. Second valvulae as in Figs. 120–122 ..... ***PRETIOSCOPUS*** gen. n. (in part) (p. 243)
– First subapical cell of forewing open. Apex of style expanded. Second valvulae as in Fig. 111 ***PANDACERUS*** gen. n. (in part) (p. 240)
9 Lora reaching facial margin throughout length (Fig. 59) ..... ***THERONOPUS*** gen. n. (p. 232)
– Lora not as above 10
10 Pronotum finely and transversly striate ..... ***CAFIXIA*** gen. n. (p. 249)
– Pronotum shagreened 11
11 Vertex finely and transversely striate 12
– Vertex shagreened 13
12 First subapical cell of forewings open. Male Xth segment fused to pygophore (Fig. 136) ***RHUSOPUS*** gen. n. (p. 250)
– First subapical cell of forewings closed. Male Xth segment not fused to pygophore ***PRETIOSCOPUS*** gen. n. (in part) (p. 243)
13 Face with a dark brown spot below each eye (Fig. 47) ..... ***MALDONADORA*** gen. n. (p. 228)
– Face not as above 14
14 Lora reaching facial margin over ventral one-fifth to one-third (Fig. 54). Aedeagus with a pair of basal dorsally directed processes ..... ***YACHANDRA*** gen. n. (p. 230)
– Lora separated from facial margin throughout length. Aedeagus with a pair of subapical ventrally directed processes 15
15 Style with preapical lobe lateral (Fig. 110). Second valvulae with several prominent teeth (Figs 112, 113) ..... ***PANDACERUS*** gen. n. (in part) (p. 240)
– Style with preapical lobe ventral. Second valvulae with numerous very fine teeth (Fig. 131) ***GROOTONIA*** gen. n. (p. 248)

KOPAMERRA gen. n.

Type-species: *Idiocerus haupti* Melichar.

Pale yellow, head mottled with brown to orange or with three to four transverse orange bands anteriorly; veins of forewing marked with brown and white patches.

Head 1·12–1·17 times as wide as pronotum, shagreened. Vertex 4·0–4·7 times as wide as long, of uniform length. Face 1·25 times as wide as long; eyes moderately large, inner margin of eyes 0·83 times perpendicular length of face below eyes; interocellar width 2·5 times ocellocular width; laterofrontal sutures extended to corresponding ocellus, more or less straight; lora separated from facial margin throughout length; clypellus with sides concave, apex equal in width to base or narrower than base; rostrum extended to mid or hind coxae. Pronotum shagreened. Scutellum equal in length to combined length of pronotum and vertex, shagreened. Forewing with first subapical cell open, second closed, third present. Hind femur with apical setal formula 2+0. Hind tibia flattened, with 14–22 spines in row 1, five to six spines in row 2 and four to eight spines in row 3.

Male dorsal basal abdominal apodemes strut-like, ventral basal abdominal apodemes lobe-like.

Male genitalia with pygophore with inner surface of dorsal margin with a narrow sclerotized band,

sometimes becoming strut-like (Fig. 17); posterior margins with a small protuberance and hyaline region slightly dorsad of midlength. Xth segment loosely attached to pygophore, apices of lateral arms produced ventrally or bifurcate. Subgenital plate narrowly spatulate in lateral aspect, several long fine marginal setae distally and a few very short spine-like setae ventrally. Connective Y-shaped with a dorsomedial keel. Style with apical process elongate, apex upturned, foot-like; preapical lobe ventral. Aedeagus with shaft directed dorsally, elongate, laterally compressed, tapered or expanded to apex in lateral aspect, one or two pairs of subapical ventrally directed processes, gonopore subapical on posterior surface; basal apodeme elongate.

Female genitalia with first valvulae transversely striate dorsolaterally. Second valvulae moderately long and narrow or elongate, several to numerous prominent teeth over distal one-half to three-quarters of valvulae; sclerotized region basad of teeth situated at dorsal margin; without a dorsal hyaline region.

DISTRIBUTION. Widespread throughout the Afrotropical region and Madagascar.

REMARKS. This genus can be distinguished by the following combination of characters: head with orange transverse bands in some species, male dorsal abdominal apodemes strut-like, male pygophore with a protuberance from posterior margins and a sclerotized region at the inner dorsal margin of the male pygophore. All but the first of these characters are found in *Rotifunkia*, but this genus is darker in colour, has smaller eyes and the subgenital plates have short spine-like setae.

Members of the genus can be separated into the *haupti*- and *sparsa*-groups on the basis of colour differences (see key). In addition, the rostrum and ovipositor valvulae are longer and the style apex broader in the *sparsa*-group. Females of this group cannot be identified to species as they are similar in colour and have similar second valvulae. However, I have tenatively identified some females by associating them with males from the same localities.

Key to the species of *Kopamerra*

Females of the *sparsa*-group are indistinguishable (see above).

1 Anterior region of head with three to four transverse orange bands (***haupti***-group) 2
– Anterior region of head with orange to brown patches (***sparsa***-group, males only) 5
2 Anterior region of head with four transverse orange bands. Aedeagus and second valvulae as in Figs 2, 5, 6 ..... ***haupti*** (Melichar) (p. 221)
– Anterior region of head with three transverse orange bands 3
3 Pronotum with two transverse orange bands (Fig. 9) ..... ***dentata*** sp. n. (p. 222)
– Pronotum not as above 4
4 Aedeagal processes long (Fig. 3). Second valvulae as in Fig. 7. Length up to 4·1 mm ***bifurcata*** (Webb) (p. 223)
– Aedeagal processes short (Fig. 4). Second valvulae as in Fig. 8. Length over 4·7 mm ***divergens*** (Webb) (p. 223)
5 Aedeagus with one short and one long pair of processes (Figs 14–16) ..... ***sparsa*** (Webb) (p. 223)
– Aedeagus with processes short (Figs 18–20) ..... ***truncata*** (Webb) (p. 224)

Kopamerra haupti (Melichar) **comb. n.**

(Figs 1, 2, 5, 6)

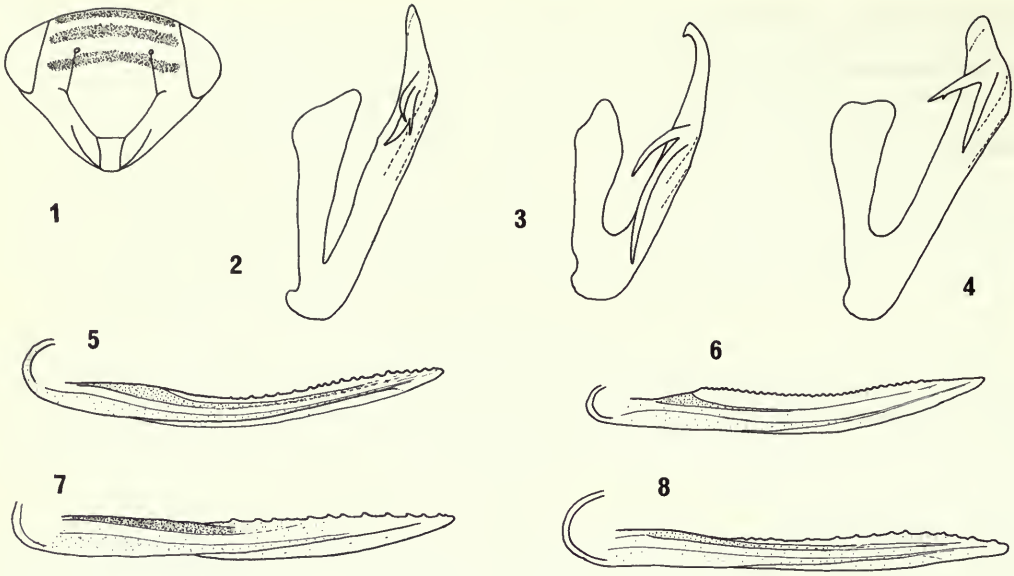
Idiocerus haupti Melichar, 1908: 65, figs 1, 2. Holotype ♀, TANZANIA (MM) [examined].
Idiocerus exus Freytag & Knight, 1966: 76, figs 1–10. Holotype ♂, MADAGASCAR (MNHN) [examined]. **Syn. n.**

MATERIAL EXAMINED

Numerous examples from **Sudan, Chad, Nigeria, Central African Republic, Angola, Tanzania, South Africa, Madagascar** (BMNH; RL; USNM; SMNS; SM; MRAC).

REMARKS. This species varies considerably in the extent of the brown and whitish markings on the forewings, and a few specimens examined have two brown transverse bands.

Collected on *Haplocoelum foliolosum* in Angola.



Figs 1–8 *Kopamerra* species. 1, 2, *K. haupti.* (1) face; (2) aedeagus. 3, *K. bifurcata,* aedeagus. 4, *K. divergens,* aedeagus. 5, 6, *K. haupti.* (5) second valvulae, holotype; (6) same, Sudan. 7, *K. bifurcatus*, second valvulae. 8, *K. divergens,* second valvulae.

Kopamerra dentata sp. n.

(Figs 9–13)

Length: ♂, 5·0 mm; ♀, 5·8 mm.

Pale yellow with three transverse orange bands anteriorly on head and two on pronotum.

Male genitalia with upturned apex of style narrow with a subapical tooth. Aedeagus with shaft of similar width to near apex in lateral aspect, tapered distally to narrowly rounded apex; two pairs of lateral subapical ventrally directed processes, one pair very short, the other moderately long, bifurcate and situated more ventrally.

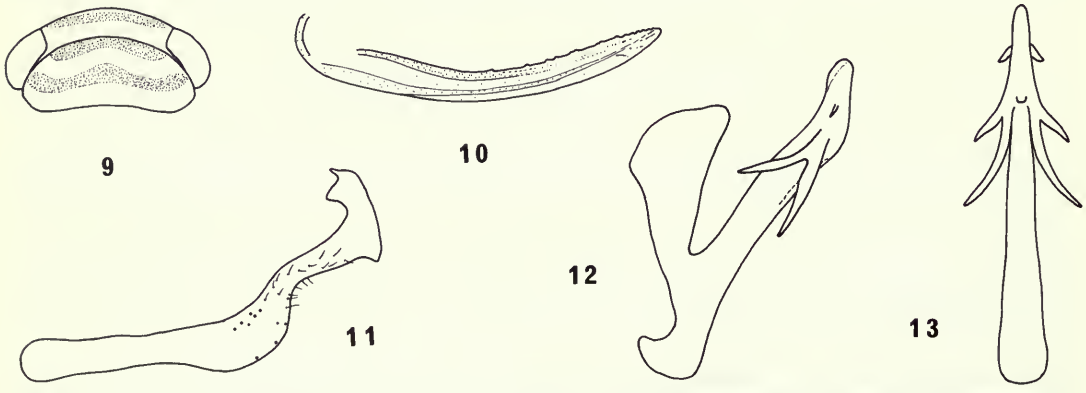
Female genitalia with second valvulae toothed over slightly less than its distal half, sclerotized region at dorsal margin moderately long.

MATERIAL EXAMINED

Holotype ♂, **Kenya**: Likoni, xi.1911 (*Alluaud & Jeannel*) (MNHN).

Paratype. **Kenya**: 1 ♀, Diani Beach, v.1957 (*N. L. H. Krauss*) (BMNH).

REMARKS. This species can be distinguished by the two transverse orange bands on the pronotum and the shape of the male and female genitalia, as noted above.



Figs 9–13 *Kopamerra dentata.* 9, head and pronotum; 10, second valvulae; 11, style; 12, 13, aedeagus.

Kopamerra bifurcata (Webb) comb. n.

(Figs 3, 7)

Idiocerus bifurcatus Webb, 1975: 168, figs 1–12. Holotype ♂, UGANDA (BMNH) [examined].

MATERIAL EXAMINED

Uganda: 1 ♂ (holotype), 1 ♀, Lolet, Karamoja (BMNH). **Tanzania**: 1 ♂ (BMNH).

Kopamerra divergens (Webb) comb. n.

(Figs 4, 8)

Idiocerus divergens Webb, 1975: 169, figs 13–22. Holotype ♂, ANGOLA (BMNH) [examined].

MATERIAL EXAMINED

Angola: 45 ♂, 36 ♀ (type-series), Salazar, I.I.A.A., at light (BMNH; 1 ♂, 1 ♀, PPRI).

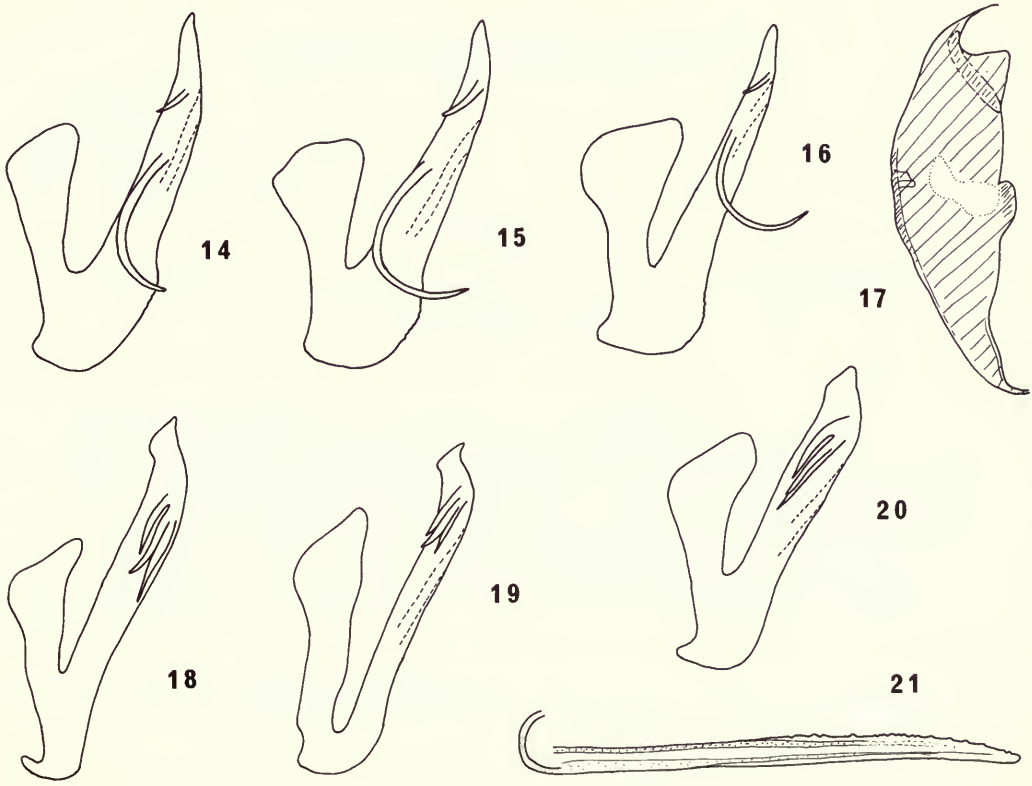
Kopamerra sparsa (Webb) comb. n.

(Figs 14–17)

Idiocerus sparsus Webb, 1975: 172, figs 23–32. Holotype ♂, NIGERIA (BMNH) [examined].

MATERIAL EXAMINED

Gambia: 1 ♂, Tendeba Camp nr R. Gambia (MZE). **Nigeria**: 2 ♂, Malumfashi (RL); 2 ♂, 2 ♀ (including type-series), Zaria, Samaru (BMNH); 1 ♂, 2 ♀ Ile-Ife (BMNH). **Chad**: 1 ♂, Bahr-el-Ghazal (MNHN).



Figs 14–21 *Kopamerra* species. 14–17, *K. sparsa*. (14) aedeagus, Central African Republic (MNHN); (15) same, Ivory Coast (MNHN); (16) same, Nigeria (RL); (17) left side of male pygophore, posterior view. 18–21, *K. truncatus*. (18) aedeagus, South Africa (BMNH); (19) same, Tanzania (MRAC); (20) Angola (BMNH); (21) second valvulae.

Kopamerra truncata (Webb) **comb. n.**

(Figs 18–21)

Idiocerus truncatus Webb, 1975: 172, figs 33–41. Holotype ♂, ANGOLA (BMNH) [examined].

MATERIAL EXAMINED

Nigeria: 1 ♂, 3 ♀, Samaru (BMNH). **Central African Republic**: 1♂, Bossangoa, Bossembele (RL). **Zaire**: 1 ♂, Elizabethville; 1 ♀, Kapanga; 1 ♂, 2 ♀, Albertville; 1 ♂, Kivu, Kavimvira (Uvira) (all IRSNB). **Tanzania**: 1 ♂, Musosa (IRSNB). **Zimbabwe**: 1 ♂, Bulawayo (BMNH). **Angola**: 7 ♂, 4 ♀ (type-series), Duque de Braganca Falls (BMNH). **South Africa**: 4 ♂, 1 ♀, Rustenburg (BMNH; RL).

ROTIFUNKIA China

Rotifunkia China, 1926: 672. Type-species: *Paropia guttifera* Walker, by original designation.

Head and thorax brown, marked with pale yellow at least laterally on face below eyes. Forewing dark brown with a subapical hyaline patch on or near costal margin; with or without white or yellow patches.

Head 1·09–1·10 times as wide as pronotum, shagreened. Vertex 5·5–7·5 times as wide as medial length; of uniform length or shorter medially than length next to eyes. Face 1·15 times as wide as long; eye small, inner margin of eye 0·66 times perpendicular length of face below eyes; interocellar width 2·7 times ocellocular width; laterofrontal sutures extended approximately one-half distance to corresponding ocellus, more or less straight; lora separated from facial margin throughout length; clypellus with sides concave, apex equal in width to base or narrower than base; rostrum extended to near hind coxae. Pronotum shagreened. Scutellum equal in length to combined length of pronotum and vertex, shagreened. Forewing with first subapical cell open, second closed, third present. Hind femur with apical setal formula 2+0. Hind tibia flattened, with 3–12 spines in row 1, 3–5 spines in row 2 and 3–5 spines in row 3; distal spines of row 2 with a weak basal process.

Male dorsal basal abdominal apodemes strut-like, ventral basal abdominal apodemes lobe-like.

Male genitalia with posterior margins of pygophore with a small protuberance slightly distad of midlength; infolded dorsal margins of pygophore with a narrow sclerotized band. Tenth segment fused to pygophore; expanded posteriorly in lateral aspect. Subgenital plates expanded at midlength in lateral aspect, several short spine-like marginal setae dorsally and ventrally. Connective Y-shaped with a dorsomedial keel. Style with apical process relatively short, foot-shaped; preapical lobe ventral. Aedeagus with shaft directed dorsally, elongate, cylindrical basally, laterally compressed and slightly expanded subapically in lateral aspect, a pair of short ventrally directed processes near apex and a pair of long ventrally directed processes at approximately one-third distance from apex to base of shaft, gonopore subapical on posterior surface; basal apodeme elongate.

Female genitalia with first valvulae transversely striate dorsolaterally. Second valvulae moderately long and narrow; several prominent teeth over slightly more than distal half of valvulae; sclerotized region basad of teeth situated at dorsal margin; without a dorsal hyaline region.

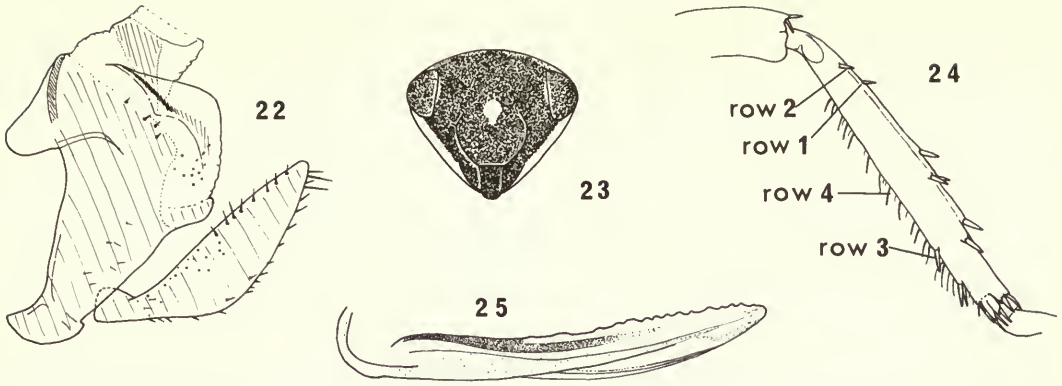
DISTRIBUTION. Northern tropical Africa.

REMARKS. This genus has several characters in common with *Kopamerra* (see remarks under that genus) but can be distinguished by the following combination of characters: dark colour, eyes small and subgenital plate with short spine-like marginal setae. Maldonado Capriles (1971) reviewed the two species in this genus, but the following points should also be noted. The spinulation of the hind tibia is reduced in *guttifera* (Fig. 24), there being only three to five spines in row 1 compared to 12 in *agallioides*. There is some variation in the extent of the yellow markings in *guttifera*, although those on the vertex and pronotum never reach the distinctness of the markings in *agallioides* (see Maldonado Capriles, 1971: 203, fig. 11). As the male genitalia of *guttifera* and *agallioides* are almost identical, the two species are only tentatively regarded as distinct on superficial differences. The female of *agallioides* is unknown. The distinctive facial markings in this genus are more typical of those found in the Eurymelinae.

Key to the species of *Rotifunkia* (males)

1 Vertex and pronotum with distinct yellow markings. Hind tibia with 12 spines in row 1 ***agallioides*** Maldonado Capriles (p. 225)

– Vertex and pronotum with yellow markings absent or indistinct. Hind tibia with three to five spines in row 1 (fig. 24) ..... ***guttifera*** (Walker) (p. 225)



Figs 22–25 *Rotifunkia guttifera*. 22, male genital capsule; 23, face; 24, left hind leg; 25, second valvulae.

Rotifunkia guttifera (Walker)

(Figs 22–25)

Paropia guttifera Walker, 1851: 845. Holotype ♀ [no data] (BMNH) [examined].
Rotifunkia guttifera (Walker) Maldonado Capriles, 1971: 203, figs 15–24.

MATERIAL EXAMINED
Numerous examples from **Ivory Coast, Nigeria, Sierra Leone** (BMNH; RL).

Rotifunkia agallioides Maldonado Capriles

Rotifunkia agallioides Maldonado Capriles, 1971: 203, figs 1–14. Holotype ♂, ETHIOPIA (USNM) [examined].

MATERIAL EXAMINED
Ethiopia: 1 ♂ (holotype), nr Harrar (USNM).

CHUNRA Distant

Chunra Distant, 1907: 193. Type-species: *Iassus puncticosta* Walker, by original designation.

DISTRIBUTION. Tropical Africa, Indonesia and NE. Australia.

REMARKS. This genus, previously known only from Indonesia and NE. Australia, has been recently redescribed (Webb, 1983). The new species described below are remarkably similar to the type-species *puncticosta*, but differ mainly in the shape of the aedeagus. Members of the genus can be distinguished by the following combination of characters: face long, latero frontal sutures incurved, rostrum long, extending beyond hind coxae, forewing with brown and yellow patches on costal margin and veins, male pygophore with a long vertical lateral fold from the dorsal margin and a lateral hyaline region and process from each dorsoposterior corner, and male Xth segment with lateral arms strongly produced ventrally. In addition, *Chunra* and *Candulifera* (Webb, 1983) are the only two genera with the first valvulae imbricate rather than transversely striate dorsolaterally.

Key to the Afrotropical species of *Chunra*

1 Small species, up to 4·7 mm. Aedeagal shaft adjacent to gonopore strongly produced posteriorly (Fig. 30). Second valvulae curved slightly ventrally (Fig. 31)..... ***villa*** sp. n. (p. 226)
– Moderately large species, 4·7 mm and over. Aedeagal shaft adjacent to gonopore at most weakly produced posteriorly. Second valvulae curved slightly dorsally 2
2 Aedeagal shaft with a long medial keel dorsad of gonopore (Fig. 32). Second valvulae with teeth extended to apex (Fig. 34)..... ***doarna*** sp. n. (p. 226)
– Aedeagal shaft not as above (Fig. 36). Second valvulae with teeth not extended to apex (Fig. 37) ***olandea*** sp. n. (p. 226)

Chunra villa sp. n.

(Figs 26–31)

Length: ♂, 4·0–4·6 mm, mean 4·2 mm; ♀, 4·0–4·7 mm, mean 4·2 mm.

Head and thorax yellow, sometimes tinged with green, finely and often densely mottled with brown. Scutellum with a pair of brown basal triangles. Forewing with costal margin and veins marked with yellow and brown.

Male genitalia with shaft of aedeagus short, produced posteriorly adjacent to gonopore and produced dorsally dorsad of gonopore forming a posterior medial keel, a pair of very short processes from ventral rim of gonopore.

Female genitalia with second valvulae very long and narrow, curved slightly ventrally; several somewhat irregular teeth along medial one-third of valvulae.

Material examined

Holotype ♂, **Nigeria**: Mokwa, Zugurma, 12.i.1972 (*S. S. Chadha*) (BMNH).

Paratypes. **Ivory Coast**: 12 ♂, 19 ♀, Bingerville, i–iv, 1963–64 (*J. Decelle*) (MRAC). **Ghana**: 1 ♂, Tafo, at light, 15.v.1957 (*V. F. Eastop*) (BMNH). **Nigeria**: 23 ♂, 6 ♀, Ile-Ife, 7.i.–5.iv.1969–75 (*J. T. Medler*) (BMNH; USNM); 3 ♂, 2 ♀, Ife (RL). **Angola**: 2 ♂, 4 ♀, Duque de Braganca Falls, 11–12.iii.1972 (BMNH).

Remarks. This species can be distinguished by its small size and dorsally and posteriorly produced, short, aedeagal shaft with a dorsomedial keel. The two males from Angola have the posterior extension of the aedeagal shaft slightly longer than shown in Fig. 30.

Chunra doarna sp. n.

(Figs 32–34)

Length: ♂, 5·0–5·8 mm, mean 5·2 mm; ♀, 5·1–5·8 mm, mean 5·3 mm.

Colour as in *villa*.

Male genitalia as in *villa* but aedeagal shaft slightly longer and posterior extension less strongly produced.

Female genitalia with second valvulae similar to those of *villa* but curved slightly dorsally and teeth over distal two-thirds of valvulae.

Material examined

Holotype ♂, **Angola**: Salazar [Dala Tando], I.I.A.A., 9–15.iii.1972, at light (BMNH).

Paratypes. **Central Africa Republic**: 3 ♂, 1 ex., La Maboke, 8, 11.xi.1969 22.vii.68 (*M. Boulard*); 1 ♂, M. Bale nr La Maboke, 11.i.1970; 1 ♂, Boukoko, 27.i.1970 (*M. Boulard*) (all MNHN). **Angola:** 68 ♂, 20 ♀, same data as holotype (BMNH; USNM; AMNH).

Remarks. This species is closely related to *villa* but can be distinguished by its larger size and slightly different genitalia, as noted above. A few males from Angola lack the posterior extension of the aedeagus, and there is also some variation in the length of the aedeagal shaft between specimens from Angola and Central African Republic (see Figs 32, 33).

Chunra olandea sp. n.

(Figs 35–37)

Length: ♂, 4·7–5·2 mm, mean 5·0 mm; ♀, 5·0–5·2 mm, mean 5·1 mm.

Colour as in *villa*.

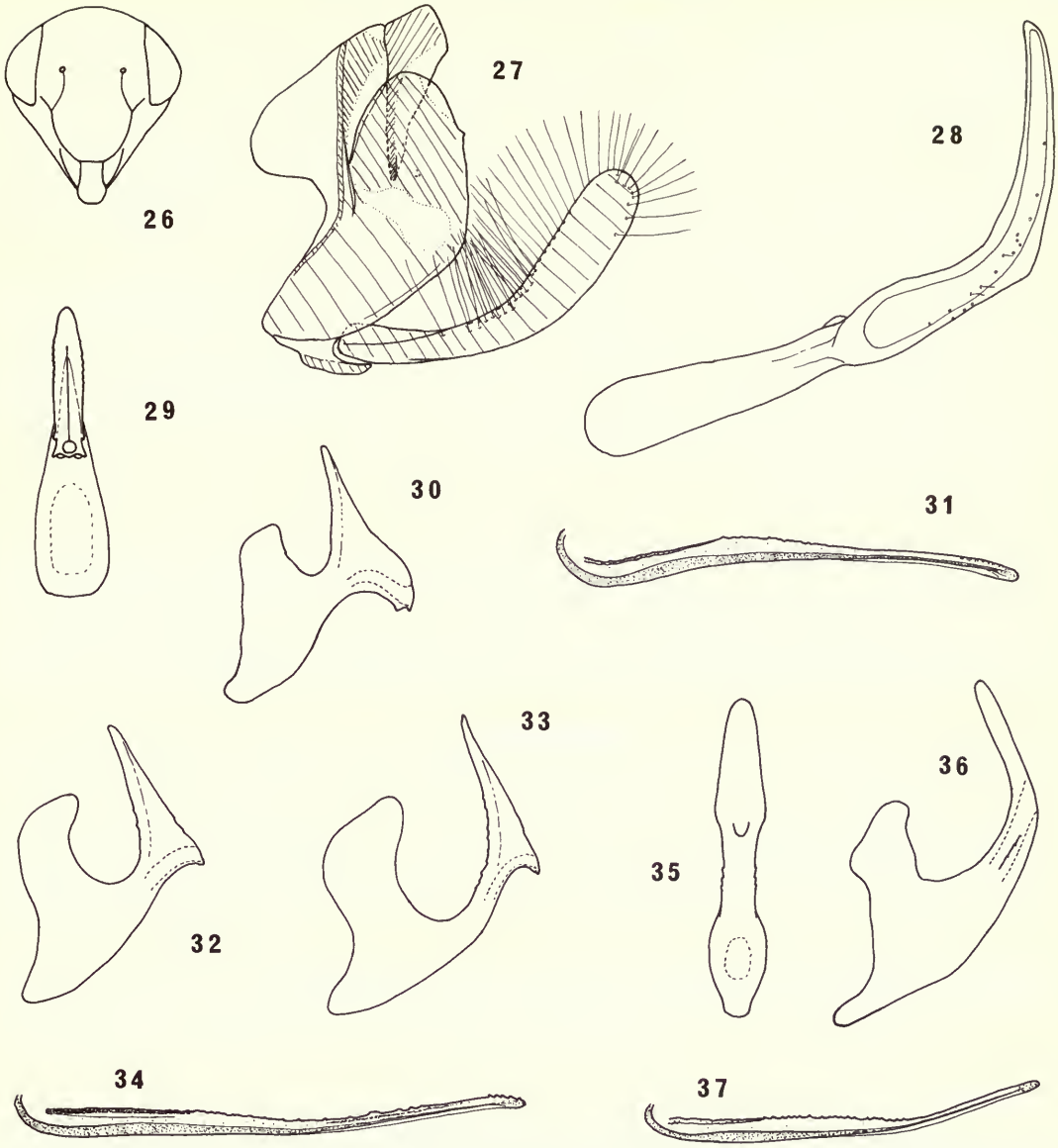
Male genitalia similar to those of *villa* and *doarna* but aedeagal shaft slightly exanded laterally in posterior aspect, without posterior extension, processes or dorsoposterior keel.

Female genitalia with second valvulae similar to those of *doarna* but teeth over medial third of valvulae.

Material examined.

Holotype ♂, **Ghana**: Tafo, at light, 29.iv.57 (*V. F. Eastop*) (BMNH).

Paratypes. **Ivory Coast**: 1 ♂, Bingerville, 15–31.iii.1962 (*J. Decelle*) (MRAC). **Ghana**: 1 ♂, Ashanti, Bobiri, 37 km SE. of Kumasi, 21.xi.1959 (*N. D. Jago*) (BMNH). **Nigeria**: 1 ♂, Ogoja, iv.1971 (*J. T. Medler*); 1 ♀, Ibadan, 13–24.vi.1977 (*J. C. Deeming*); 1 ♀, Lagos State, 6 km NW. of Agege, 26.i.1975



Figs 26–37 *Chunra* species. 26–31, *C. villa*. (26) face; (27) male genital capsule; (28) style; (29, 30) aedeagus; (31) second valvulae. 32–34, *C. doarna*. (32, 33) aedeagus; (34) second valvulae. 35–37, *C. olandea*. (35, 36) aedeagus; (37) second valvulae.

(BMNH). **Uganda**: 1 ♂, Ruwenzori Range, Semliki Forest, 905 m, 22.viii.–3.ix.1952 (*D. S. Fletcher*) (BMNH).

Remarks. This species can be distinguished from *villa* by its larger size, and from *villa* and *doarna* by its slightly different genitalia, as noted above. In the shape of the aedeagus, *olandea* is very similar to *puncticosta*, but has the shaft slightly expanded laterally in posterior aspect.

HENSLEYELLA gen. n.

Type-species: *Hensleyella ipoa* sp. n.

Pale yellow, finely and densely mottled with brown. Scutellum with a pair of brown basal triangles. Costal margin and veins of forewing with brown and yellow patches.

Head equal in width to pronotum, shagreened. Vertex 8·5 times as wide as medial length; slightly shorter medially than length next to eyes. Face equal in width to length; eye small, inner margin of eye 0·71 times perpendicular length of face below eyes; interocellar width approximately equal to ocellocular width; laterofrontal sutures extended to corresponding ocellus, more or less straight; lora separated from facial margin throughout length; clypellus with sides concave, apex wider than base; rostrum missing. Pronotum shagreened. Scutellum slightly longer than combined length of pronotum and scutellum, shagreened. Forewings with first subapical cell open, second closed, third present. Hind femur with apical setal formula 2+0. Hind tibia flattened, with 18 spines in row 1, four to five spines in row 2 and five to seven spines in row 3; distal spines of row 2 without a basal process.

Male abdomen with dorsal and ventral basal abdominal apodemes reduced.

Male genitalia with pygophore with a long vertical lateral fold from dorsal margin and a short process from each dorsoposterior corner of pygophore. Tenth segment solidly attached to pygophore anteriorly, lateral arms expanded posteriorly. Subgenital plates narrowly spatulate in lateral aspect; numerous short fine setae distally along dorsal and apical margin. Connective Y-shaped with dorsomedial keel indistinct. Style with apical process elongate, tapered to acute upturned apex; preapical lobe indistinct. Aedeagus with shaft elongate, laterally compressed, curved dorsally, gonopore apical on posterior surface; basal apodeme long with a pair of subapical posterior processes.

Female genitalia unknown.

DISTRIBUTION. Tanzania.

REMARKS. This genus can be distinguished by the following combination of characters: head equal in width to pronotum, eyes small, ocelli closely set and basal apodeme of the aedeagus with a pair of processes. It is similar to *Chunra* in having the costal margin and the veins of the forewings with yellow and brown patches, and the male pygophore with a long vertical lateral fold from the dorsal margin and a process from each dorsoposterior corner.

Hensleyella ipoa sp. n.

(Figs 38–44)

Length: ♂, 5·2 mm.

Colour as in generic description.

Male genitalia with ventroposterior corners of Xth segment curved medially, claw-like. Aedeagus with posterior margin of shaft laterally compressed, keel-like; basal apodeme with dorsoposterior processes robust, strongly curved dorsally in lateral aspect.

MATERIAL EXAMINED

Holotype ♂, **Tanzania**: 'Tanganyika', 7.v.1953 (*J. M. Hensley*) (BMNH).

MALDONADORA gen. n.

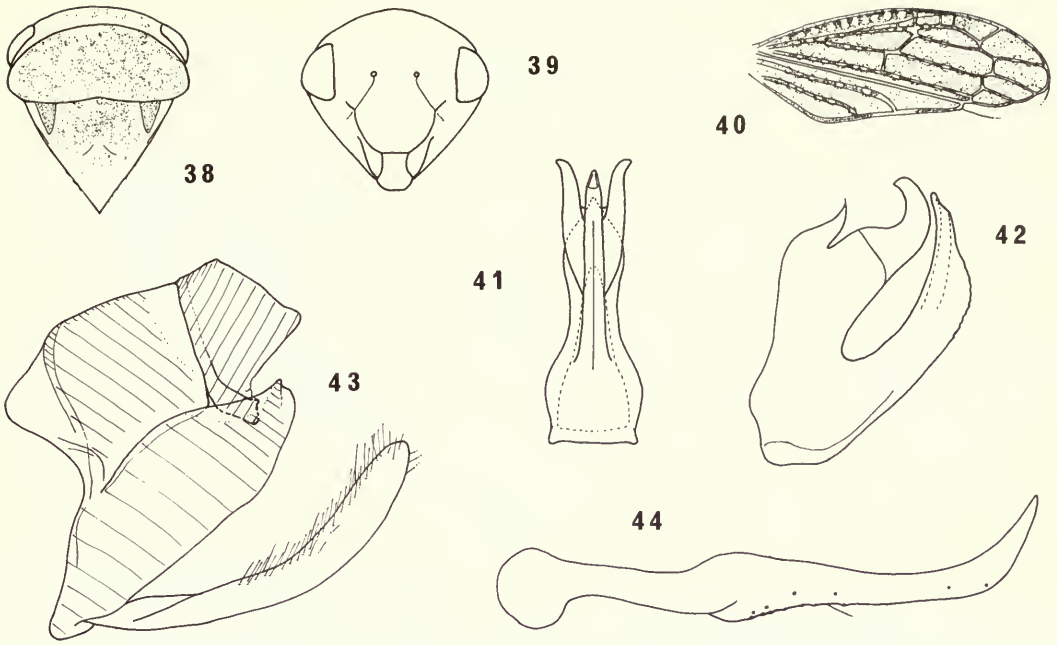
Type-species: *Maldonadora rixia* sp. n.

Pale to greenish yellow; head and thorax marked with brown, including a posterior spot on vertex near to each eye, a spot on face below each eye and a pair of basal triangles on scutellum. Forewings brownish to whitish hyaline, costal margin yellow or greenish yellow, veins concolorous with wing or mainly dark brown.

Head 1·25 times as wide as pronotum, shagreened. Vertex 5·6 times as wide as medial length; slightly shorter medially than length next to eyes. Face 1·15 times as wide as long; lateral margins of face adjacent eye with one or two spine-like setae; eye moderately large, inner margin of eye 0·83 times perpendicular length of face below eyes; interocellar width 1·7 times ocellocular width; laterofrontal sutures extended to corresponding ocellus, more or less straight; lora separated from facial margin throughout length; clypellus with sides concave, apex wider than base; rostrum extended to near hind coxae. Pronotum shagreened. Scutellum slightly longer than combined length of pronotum and vertex, shagreened. Forewing with first subapical cell open, second closed, third present. Hind femur with apical setal formula 2+0. Hind tibia flattened, with 17 spines in row 1, six spines in row 2 and seven to eight spines in row 3.

Male dorsal basal abdominal apodemes lobe-like, ventral pair reduced.

Male genitalia with pygophore with a long lateral fold from dorsal margin. Tenth segment loosely attached to pygophore, pair of very long lateral ventrally directed arms. Subgenital plates narrowly spatulate in lateral aspect; numerous long fine marginal setae dorsally and apically. Connective Y-shaped



Figs 38–44 *Hensleyella ipoa*. 38, head and thorax; 39, face; 40, forewing; 41, 42, aedeagus; 43, male genital capsule; 44, style.

with dorsomedial keel. Style with apical process elongate, curved laterally, tapered to acute apex; preapical lobe absent. Aedeagus relatively small, shaft elongate, cylindrical, curved dorsally and tapered to apex, without processes, gonopore subapical on posterior surface; basal apodeme elongate.

Female genitalia with first valvulae transversely striate dorsolaterally. Second valvulae very long and narrow, few fairly weak teeth distally; sclerotized region basad of teeth situated at dorsal margin; dorsal hyaline region absent.

DISTRIBUTION. Tropical Africa.

REMARKS. This genus can be distinguished by the following combination of characters: vertex with a pair of posterior brown spots, face with a pair of brown spots, male pygophore with a long dorsolateral fold, male Xth segment with very long lateral arms and aedeagus small.

Maldonadora rixia sp. n.

(Figs 45–52)

Length: ♂, 4·8–5·0 mm, mean 4·9 mm; ♀, 4·9–5·4 mm, mean 5·1 mm.

Colour as in generic description with head, thorax and forewings sometimes heavily marked with dark brown; veins of forewing concolorous with wing or dark brown with a whitish patch at junction of cubital vein and first *m–cu* cross vein, and at midlength and apex of radial vein.

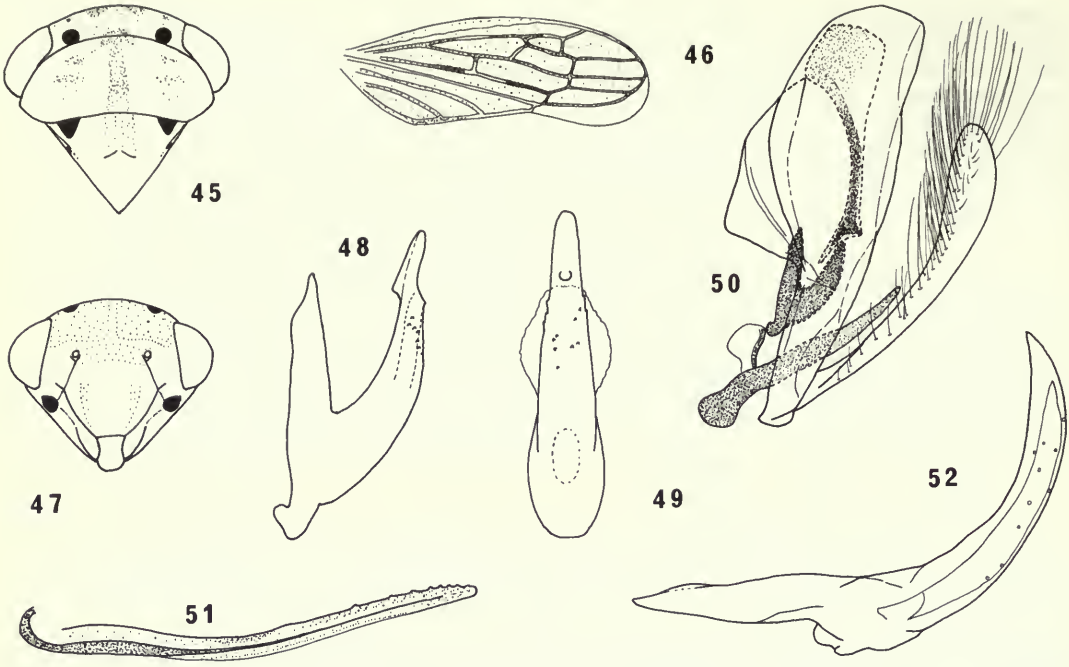
Male genitalia with aedeagal shaft with a pair of triangular lateral flanges arising apically on anterior surface, posterior margin of shaft abruptly narrowed subapically in lateral aspect.

Female genitalia as in generic description.

MATERIAL EXAMINED

Holotype ♂, **Nigeria**: Udo F R, MW State, 11.iv.1975 (*J. T. Medler*) (BMNH).

Paratypes. **Nigeria**: 1 ♀, same data as holotype (BMNH). **Cameroun**: 1 ♂, Matute, Tiko Plantation, 24.iv., 6.v.1949 (*B. Malkin*) (CAS); 1 ♂, 2 ♀, Yaoundé, xi.1964 (*P. B. de Miré*) (MNHN). **Central African Republic**: 3 ♂, 1 ♀, Boukoko, P.L., 7.xii.1968 (*M. Boulard*) (MNHN); 4 ♂, 10 ♀, 2 ex.; La Maboke, P.L., 3.x.–ii.1968–74 (*M. Boulard*) (*P. Kombo*) (MNHN; BMNH).



Figs 45–52 *Maldonadora rixia*. 45, head and thorax; 46, forewing; 47, face; 48, 49, aedeagus; 50, male genital capsule; 51, second valvulae; 52, style.

YACHANDRA gen. n.

Type-species: *Idiocerus projectus* Webb.

Pale yellow; vertex usually with a brown anterior spot near to each eye and scutellum usually with a pair of brown basal triangles.

Head 1·18–1·27 times width of pronotum, shagreened. Vertex 4·6–5·0 times as wide as medial length, slightly shorter medially than length next to eyes. Face 1·20–1·35 times as wide as long, shagreened; eye large, inner margin of eyes 0·83–1·00 times perpendicular length of face below eyes; interocellar width twice ocellocular width; laterofrontal sutures extended two-thirds distance to point adjacent to corresponding ocellus, more or less straight; lora extended to facial margin over ventral one-third to one-fifth; clypellus with sides concave, apex equal in width to base; rostrum extended to mid coxae. Pronotum shagreened. Scutellum slightly shorter than combined length of pronotum and vertex, shagreened. Forewing with first subapical cell open, second closed, third present. Hind femur with apical setal formula 2+0. Hind tibia flattened, with seven to nine spines in row 1, four to six spines in row 2 and four to five spines in row 3.

Male dorsal and ventral basal abdominal apodemes lobe-like.

Male genitalia with pygophore with a long lateral fold from dorsal margin; dorsoposterior corner of pygophore produced. Tenth segment solidly attached to pygophore, lateral arms with internal ledges, apices bifurcate with lower branch membranous basally. Subgenital plates elongate, very narrowly spatulate; several moderately long fine marginal setae distally. Connective Y-shaped with a pair of dorsolateral keels. Style with apical process elongate, curved dorsolaterally, tapered distally to acute apex, several relatively long fine setae laterally; preapical lobe indistinct. Aedeagus with shaft elongate, laterally compressed, directed dorsally and tapered to apex, pair of lateral dorsally directed processes arising basally, sometimes with a medial ventrally directed posterior process arising subapically, gonopore apical or subapical on posterior surface; basal apodeme moderately long.

Female genitalia with first valvulae transversely striate dorsolaterally. Second valvulae elongate, few prominent teeth distally; sclerotized region basad of teeth situated at or near dorsal margin; dorsal hyaline region indistinct.

Distribution. South Africa, South West Africa.

REMARKS. This genus can be distinguished by the following combination of characters: lora extending to the facial margin ventrally, male pygophore with dorsoposterior corners produced, male Xth segment with ventral arms membranous basally, connective with paired dorsal keels, styles with long lateral setae and the aedeagus with a pair of dorsally directed basal processes.

Key to the species of *Yachandra*

1 Aedeagus with three processes. Length: 3·9–4·0 mm. South West Africa.... ***projecta*** (Webb) (p. 231)
– Aedeagus with two processes. Length: 4·1–4·7 mm. South Africa ..... ***torana*** sp. n. (p. 231)

Yachandra projecta (Webb) comb. n.

(Fig. 57)

Idiocerus projectus Webb, 1975: 173, figs 46–57. Holotype ♂, SOUTH WEST AFRICA (BMNH) [examined].

MATERIAL EXAMINED
South West Africa: 10 ♂, 15 ♀ (including type-series), Aus (BMNH).

Yachandra torana sp. n.

(Figs 53–56, 58)

Length: ♂, 4·4 mm; ♀, 4·1–4·7 mm, mean 4·4 mm.

Pale yellow; vertex with a dark brown spot near each eye, scutellum with a pair of brown basal triangles.

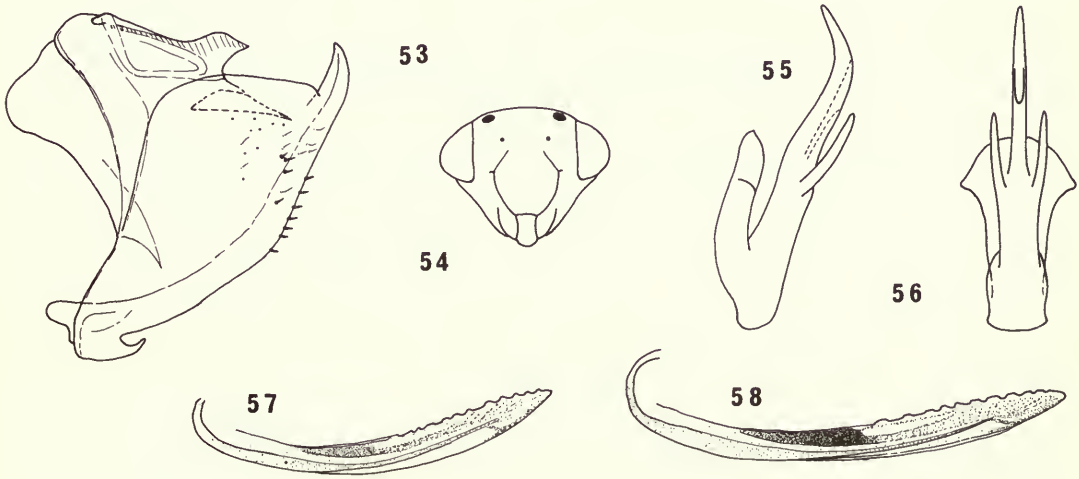
Male genitalia with dorsoposterior corner of pygophore actutely produced. Aedeagal shaft sinuate in lateral aspect, pair of moderately long dorsally directed processes arising slightly basad of midlength of shaft, gonopore elongate.

Female genitalia as in generic description.

MATERIAL EXAMINED
Holotype ♂, **South Africa**: Rustenburg, on *Mimusops zeyheri,* 12.iii.1965 (*A. L. Capener*) (NCP).
Paratypes. **South Africa**: 3 ♀, 1 ex., Rustenburg, 20.ii, 12.iii.1965 (*A. L. Capener*) (NCI; BMNH); 1 ♀, 1 ex., Hartebeespoort Dam, 20.v.1965 (*P. Paliatseas*) (NCI).

REMARKS. This species can be distinguished from *projecta* by its slightly smaller size and the two rather than three aedeagal processes.

Collected on *Mimusops zeyheri*.



Figs 53–58 *Yachandra* species. 53–56, *Y. torana.* (53) male genital capsule; (54) face; (55, 56) aedeagus. 57, *Y. projecta*, second valvulae. 58, *Y. torana,* second valvulae.

THERONOPUS gen. n.

Type-species: *Idiocerus angulatus* Webb.

Yellow to stramineous; vertex with a dark brown anterior spot near each eye; head and thorax sometimes mottled with brown; scutellum with a pair of basal dark brown triangles or spots; veins of forewing concolorous with wing or brown with whitish spots.

Head 1·14–1·24 times as wide as pronotum, shagreened. Vertex 4·0–7·0 times as wide as medial length, equal in length or shorter medially than length next to eyes. Face 1·07–1·25 times as wide as long; eyes large, inner margin of eye approximately equal in length to perpendicular length of face below eyes; interocellar width twice ocellocular width; laterofrontal sutures extended approximately one-half distance to corresponding ocellus; lora extended to facial margin throughout length; clypellus with sides concave, apex wider than base; rostrum extended to near hind coxae. Pronotum shagreened. Scutellum slightly shorter than combined length of pronotum and vertex, shagreened. Forewing with first subapical cell open, second closed, third present. Hind femur with apical setal formula 2+0 or 2+1. Hind tibia flattened, with 11–21 spines in row 1, five to seven spines in row 2 and five to nine spines in row 3; distal spines of row 2 with a weak basal process.

Male basal abdominal apodemes lobe-like, dorsal pair small to large, ventral pair elongate or reduced.

Male genitalia with Xth segment variable (see remarks below), either solidly or loosely attached to pygophore (Figs 73, 91), rarely fused to pygophore anteriorly (Fig. 87). subgenital plates narrowly spatulate in lateral aspect, several long fine marginal setae distally and often a few short spine-like setae ventrally. Style with apical process elongate, tapered to apex, or apex foot-shaped; preapical lobe ventral, dorsal or medial, sometimes indistinct. Aedeagus with shaft curved dorsally, elongate, tapered to apex, laterally compressed, often posterior margin more strongly compressed laterally; with or without a longitudinal flange on each side of shaft or a pair of subapical ventrally directed processes; gonopore apical on posterior surface; basal apodeme short.

Female genitalia with first valvulae transversely striate dorsolaterally. Second valvulae moderately long and narrow, few prominent teeth over distal half of valvulae; sclerotized region at dorsal margin moderately long; dorsal hyaline region present or absent.

Distribution. Widespread throughout the Afrotropical region.

Remarks. Members of this genus can be distinguished by their broad lora which in all but one species extend to the facial margin throughout their length. The species *mimicus* is tentatively included in *Theronopus* but differs from other members of the genus in having the lora not extending to the facial margin, the clypellus slightly narrower apically than basally and the rostrum extending to slightly beyond the hind coxae. In addition, *mimicus* has the fore margin of the head angularly rather than evenly rounded, which is unique for the subfamily.

With the exception of one species (*mtitoensis*) the genus can be divided into two groups on the basis of the hind femoral spines and male abdominal apodemes and genitalia. One group, comprising *mopanei, spicatus, robustus, loratus, mimicus, ohopohoensis* and *aethiopicus*, has the hind femora with apical setal formula 2+1 rather than 2+0, the lora, except in *mimicus* slightly longer than in other species with the dorsal suture of the lora more transverse (see Figs 59, 102), the dorsal abdominal apodemes smaller and more widely spaced, the dorsal transverse region of the male pygophore (Fig. 95) triangular rather than of uniform width and the lateral arms of the male Xth segment narrower in lateral aspect with internal marginal ledges and apices bifurcate rather than produced ventrally (*aethiopicus* male unknown). The species *mtitoensis* has the above combination of characters with the exception that the setal formula at the apex of the hind femora is 2+0. This difference and those in *mimicus* make relationships unclear, both within the genus and with other genera.

Females of most species of *Theronopus* cannot be identified with certainty as many are similar in colour and have similar second valvulae. In the present work females are tentatively identified by association with males of similar appearance and from the same localities. Of the females so named, there is some variation in the shape of the second valvulae between the following five species-groups: *harpago* and *angulatus* (Fig. 64); *lobatus* (Fig. 79); *bicornis, serratus, tsavoensis* and *quadriocellatus* (Fig. 94); *mtitoensis* (Fig. 99); *mopanei, spicatus, robustus, mimicus* and *aethiopicus* (Fig. 100).

Key to the species of *Theronopus* (males)

1 Aedeagus with a pair of subapical processes 12
– Aedeagus without processes 2
2 Aedeagal shaft very long and narrow, strongly curved dorsally and anteriorly
quadriocellatus (Melichar) (p. 237)
– Aedeagal shaft not as above 3
3 Aedeagal shaft with a pair of serrated posterior flanges (Fig. 69) ..... ***serratus*** (Webb) (p. 235)
– Aedeagal shaft not as above 4
4 Style with an elongate dorsal or medial preapical lobe 5
– Style not as above 7
5 Style with preapical lobe dorsal; aedeagal shaft narrow in lateral aspect (Fig. 80)
tanzaniaensis sp. n. (p. 235)
– Style with preapical lobe medial; aedeagal shaft relatively broad in lateral aspect (Fig. 74) 6
6 Aedeagal shaft with a pair of lateral flanges (Figs 66, 74) ..... ***lobatus*** (Webb) (p. 237)
– Aedeagal shaft not as above ..... ***citrinus*** (Melichar) (p. 237)
7 Style apex bifurcate (Fig. 70) ..... ***bifidus*** sp. n. (p. 235)
– Style apex not bifurcate 8
8 Style apex foot-like (Fig. 86) ..... ***alargus*** sp. n. (p. 236)
– Style apex acute 9
9 Style with ventral margin serrate subapically (Fig. 105) ..... ***ohopohoensis*** (Linnavuori) (p. 240)
– Style not as above 10
10 Style apex straight (Fig. 67) ..... ***tsavoensis*** sp. n. (p. 234)
– Style apex curved medially 11
11 Aedeagus with socle region broad in lateral aspect (Fig. 60) ..... ***angulatus*** (Webb) (p. 233)
– Aedeagus with socle region narrow in lateral aspect (Fig. 63) ***harpago*** (Heller & Linnavuori) (p. 233)
12 Lora extending to facial margin throughout length; vertex evenly rounded to face 13
– Lora not extending to facial margin; vertex angularly rounded to face ..... ***mimicus*** (Webb) (p. 240)
13 Aedeagal processes short (Fig. 98) 14
– Aedeagal processes long (Fig. 88) ..... ***bicornis*** sp. n. (p. 237)
14 Aedeagal shaft with anterior margin evenly curved dorsad in lateral aspect 15
– Aedeagal shaft with anterior margin triangularly produced subapically in lateral aspect 17
15 Style with a ventral subapical process ..... ***spicatus*** (Webb) (p. 239)
– Style not as above 16
16 Aedeagal shaft abruptly narrowed subapically (Fig. 98) ..... ***mtitoensis*** sp. n. (p. 238)
– Aedeagal shaft not as above ..... ***mopanei*** (Webb) (p. 238)
17 Anterior margin of aedeagus above processes strongly curved dorsad ..... ***loratus*** (Webb) (p. 239)
– Aedeagus not as above ..... ***robustus*** (Webb) (p. 239)

Theronopus angulatus (Webb) comb. n.

(Figs 59–61)

Idiocerus angulatus Webb, 1975: 181, figs 93–103. Holotype ♂, KENYA (BMNH) [examined].

MATERIAL EXAMINED

Ethiopia: 1 ♂, Gemu-Goya Prov., 30 km S. of Turmi (MRAC). **Kenya**: 9 ♂, 10 ♀ (type-series), Wajir (BMNH; 1 ♂, 1 ♀, PPRI).

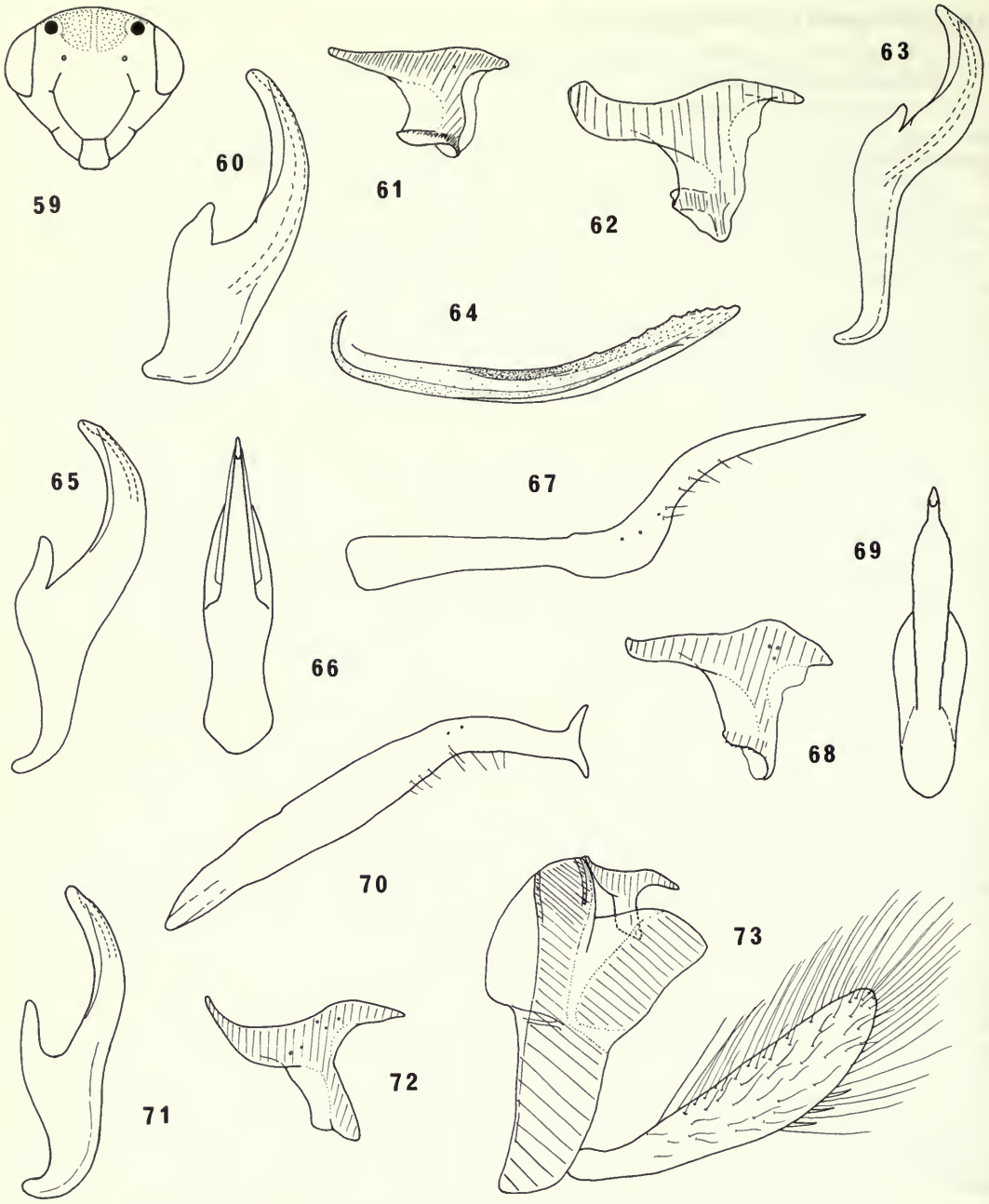
Theronopus harpago (Heller & Linnavuori) comb. n.

(Figs 62–64)

Idiocerus harpago Heller & Linnavuori, 1968: 23, figs 5–11; Webb, 1975: 183, figs 104–112. Holotype ♂, ETHIOPIA (SMN) [examined].

MATERIAL EXAMINED

Ethiopia: 1 ♂ (holotype), 1 ♀ (allotype), Awash, 960 m (SMN); 2 ♂ (paratypes), Aouash, 900 m (RL).



Figs 59–73 *Theronopus* species. 59–61, *T. angulatus*. (59) face; (60) aedeagus; (61) male Xth segment. 62–64, *T. harpago*. (62) male Xth segment; (63) aedeagus; (64) second valvulae. 65–68, *T. tsavoensis*. (65, 66) aedeagus; (67) style; (68) male Xth segment. 69, *T. serratus*, aedeagus. 70–73, *T. bifidus*. (70) style; (71) aedeagus; (72) male Xth segment; (73) male genital capsule.

Theronopus tsavoensis sp. n.

(Figs 65–68)

Length: ♂, 4·5 mm; ♀, 4·6 mm.

Pale yellow, head and thorax mottled with brown; vertex with a small dark brown spot near each eye;

scutellum with a pair of dark brown basal triangles. Forewing brownish hyaline with whitish patches including two large patches from corium, one near midlength of wing and one near apex of wing; veins concolorous with wing.

Hind femur with apical setal formula 2+0.

Male basal abdominal apodemes with dorsal pair broad, ventral pair reduced.

Male genitalia with dorsal transverse region of pygophore of uniform width. Tenth segment loosely attached to pygophore, apices of lateral arms produced ventrally. Style evenly tapered over distal one-third to acute apex. Aedeagus with shaft moderately long, evently tapered to narrowly rounded apex, posterior margin strongly compressed, pair of lateral flanges from near base of anterior margin to near apex of shaft.

Female genitalia with second valvulae as in *bicornis* (Fig. 94).

MATERIAL EXAMINED

Holotype ♂, **Kenya**: Tsavo Park, Kitani Lodge, 22.i.1968 (*Krombein & Spangler)* (USNM).

Paratypes. **Kenya**: 1 ♂, 2 ♀, same data as holotype (BMNH; USNM); 1 ♂, Mtito Andei, xii.1950 (USNM).

REMARKS. This species is similar to *harpago,* but can be distinguished by the pale patches on the forewings and the straighter apical process of the style.

Theronopus serratus (Webb) comb. n.

(Fig. 69)

Idiocerus serratus Webb, 1975: 176, figs 58–68. Holotype ♂, KENYA (BMNH) [examined].

MATERIAL EXAMINED

Kenya: 3 ♂, 1 ♀ (types-series), Wajir (BMNH).

Theronopus tanzaniaensis sp. n.

(Figs 80–83)

Length: ♂, 5·0 mm.

Yellow; vertex with a dark brown spot near each eye, scutellum with a pair of dark brown basal triangles.

Hind femur with apical setal formula 2+0.

Male basal abdominal apodemes with dorsal pair broad, ventral pair reduced.

Male genitalia with dorsal transverse region of pygophore of uniform width. Tenth segment loosely attached to pygophore, lateral arms produced ventrally. Style with an elongate dorsal preapical lobe; apical process angled medially at midlength, tapered to acute apex. Aedeagus with shaft fairly short, without lateral flanges; socle region long.

MATERIAL EXAMINED

Holotype ♂, **Tanzania**: Tabora, v.1965 (BMNH).

REMARKS. This species can be distinguished by the dorsal preapical lobe of the style and the shape of the aedeagus, as noted above.

Theronopus bifidus sp. n.

(Figs 70–73)

Length: ♂, 4·5 mm.

Head and thorax pale yellow, heavily mottled with brown, vertex with a dark brown spot near each eye, scutellum with a pair of dark brown basal triangles. Forewing brownish hyaline, veins darker brown with a whitish patch on each anal vein, two on cubital vein and one at base of inner branch of medial vein.

Hind femur with apical setal formula 2+0.

Male basal abdominal apodemes with dorsal pair broad, ventral pair reduced.

Male genitalia with dorsal transverse region of pygophore of uniform width. Lateral arms of Xth segment with apices produced ventrally. Style with apex bifurcate. Aedeagus similar to that of *tsavoensis* but shaft slightly narrower in lateral aspect.

MATERIAL EXAMINED

Holotype ♂, **South West Africa**: Otjivaronga, Abachaus, xii.1949 (*G. Hobohm*) (TM).

REMARKS. This species can be distinguished by its apically bifurcate styles.

Theronopus alargus sp. n.

(Figs 84–87)

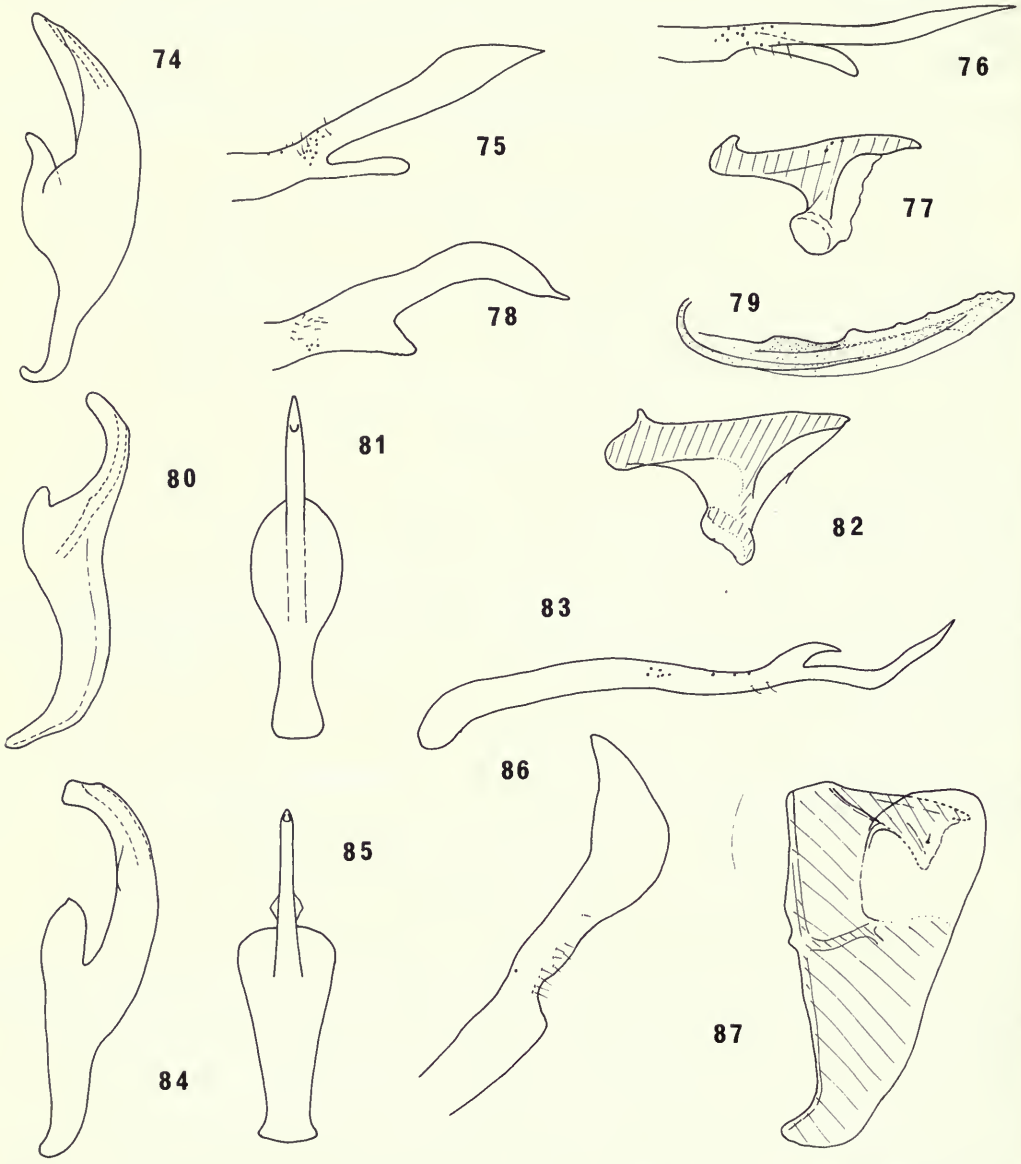
Length: ♂, 5·0–5·4 mm, mean 5·2 mm.

Head and thorax pale yellow, finely mottled with pale brown forming numerous small pale yellow spots, vertex with a brown spot near each eye, scutellum with a pair of pale brown basal triangles.

Hind femur with apical setal formula 2+0.

Male basal abdominal apodemes with dorsal pair broad, ventral pair reduced.

Male genitalia with dorsal transverse region of pygophore fused to Xth segment (Fig. 87). Lateral arms of Xth segment with apices produced ventrally. Style with apex upturned, foot-like. Aedeagus with shaft narrow in lateral aspect, apex truncate, a pair of short triangular-shaped flanges at midlength of shaft.



Figs 74–87 *Theronopus* species. 74–79, *T. lobatus*. (74) aedeagus; (75) apex of left style, ventral view, Zimbabwe; (76), same, lateral view; (77) male Xth segment; (78) apex of left style, ventral view, Angola; (79) second valvulae. 80–83, *T. tanzaniaensis*. (80, 81) aedeagus; (82) male Xth segment; (83) style. 84–87, *T. alargus*. (84, 85) aedeagus; (86) style; (87) male pygophore and Xth segment.

MATERIAL EXAMINED
Holotype ♂, **South West Africa**: Kaross (SAM).
Paratype. 1 ♂, iii.1923 (NCP).

REMARKS. This species can be distinguished by the fused dorsal transverse region of the pygophore with the Xth segment and by the shape of the aedeagus, as noted above.

Theronopus lobatus (Webb) comb. n.

(Figs 74–79)

Idiocerus lobatus Webb, 1975: 179, figs 80–83, 86–92. Holotype ♂, ZIMBABWE (BMNH) [examined].

MATERIAL EXAMINED
Zimbabwe: 1 ♂ (holotype), Bulawayo (BMNH); 1 ♂, 1 ♀, Victoria Falls Nat'l Park (USNM). **Angola**: 1 ♂, 5 km E. Capangombe, 15°05′S, 13°19′E (WSM). **South Africa**: 1 ♂, Zebediela (US); 1 ♀, Beit Bridge (TM); 3 ♂, 3 ♀, Olifants River, Kurtsteyn Bridge (NCP); 1 ♂, Letaba Est. (US).

REMARKS. There is some variation in the shape of the style in this species (see Figs 75, 78).

Theronopus citrinus (Melichar) comb. n.

Idiocerus citrinus Melichar, 1914: 2; Webb, 1975: 181, figs 84, 85. Holotype ♂, ZAIRE (MM) [examined].

MATERIAL EXAMINED
Holotype ♂, **Zaire**: Bumbuli (MM).

Theronopus quadriocellatus (Melichar) comb. n.

Pachynus quadriocellatus Melichar, 1908: 11. Lectotype ♂, TANZANIA (MM), designated by Webb, 1975: 179 [examined].
Idiocerus quadriocellatus (Melichar) Webb, 1975: 176, figs 69–79.

MATERIAL EXAMINED
Tanzania: 1 ♂ (lectotype), 3 ♀ (paralectotypes), Usambara (MM); 1 ♂ (? paralectotype), Usambara (RL). **Kenya**: 1 ♂, 1 ♀, Namanga (BMNH); 2 ♂, Namanga, S. slope of Ol Doinya Orok, 1650 m, on *Commiphora africana* (BMNH).

Theronopus bicornis sp. n.

(Figs 88–94)

Length: ♂, 4·1–4·5 mm, mean 4·3 mm; ♀, 4·6–4·8 mm, mean 4·7 mm.

Yellow to stramineous. Vertex with a dark brown spot near each eye. Scutellum with a dark brown spot in each basal angle.

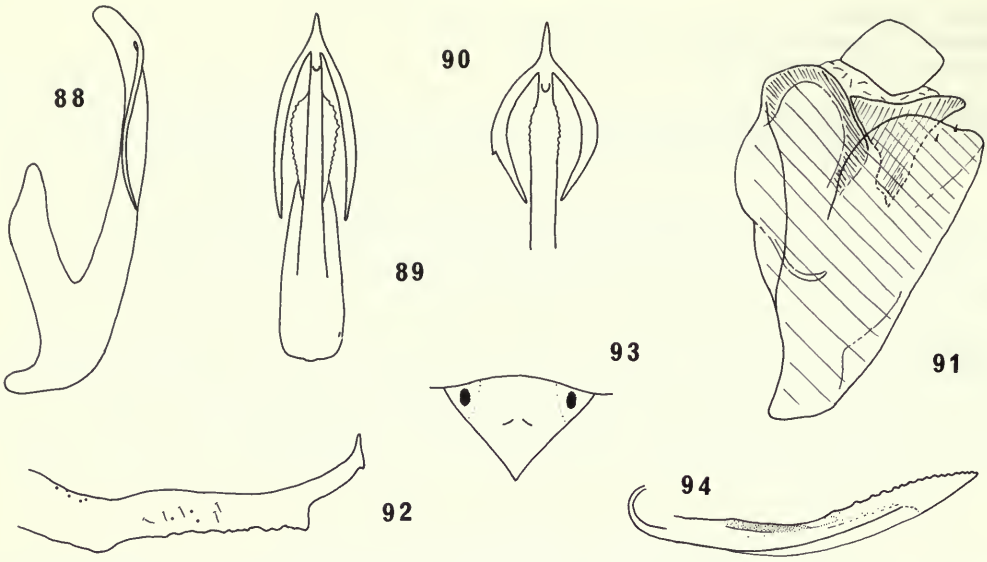
Hind femur with apical setal formula 2+0.

Male basal abdominal apodemes with dorsal pair broad, ventral pair reduced.

Male genitalia with dorsal transverse region of pygophore of uniform width. Tenth segment loosely attached to pygophore, anterior transverse region absent, lateral arms with apices produced ventrally. Style with apical process serrate basally on ventral margin, abruptly narrowed subapically. Aedeagus with shaft elongate in lateral aspect, a pair of elongate ventrally directed subapical processes arising from posterior margin, and a pair of subapical serrated longitudinal flanges situated towards either anterior or posterior margin.

Female genitalia with second valvulae as in Fig. 94.

MATERIAL EXAMINED
Holotype ♂, **South Africa**: Transvaal, Dendron, at light, 26.iii.1969 (NCP).
Paratypes. **Botswana**: 1 ♂, 2 ♀, Makarikari Pans, 20°08′S, 25°32′E, 22–23.iv.1972, on *Colophospermum mopane* (BMNH). **South West Africa**: 1 ♂, Tsumeb, vii.1974 (*J. G. Theron*) (US); 1 ♂, Gobiswater Fm, 19 km N. Grootfontein, at light, 5.iv.1972 (BMNH). **South Africa**: 10 ♂, data as holotype but 15.i, 29.ii, 22.xi.1968–69 (NCP, BMNH); 1 ♂, Mkuzi, at light, 25.i.1981 (*J. G. Theron*) (US).



Figs 88–94 *Theronopus bicornis*. 88, 89, aedeagus; 90, apex of aedeagus; 91, male pygophore and Xth segment; 92, apex of left style; 93, scutellum; 94, second valvulae.

Remarks. This species can be distinguished by its elongate aedeagal processes, in which there is some variation in the length and curvature, and in the size of the lateral aedeagal flanges (Figs 89, 90).

Recorded on *Colophospermum mopane* in Botswana.

Theronopus mtitoensis sp. n.

(Figs 95–101)

Length: ♂, 5·1 mm; ♀, 5·4 mm.

Head and thorax pale yellow heavily mottled with brown; vertex with a dark brown spot near each eye; scutellum with a pair of dark brown basal triangles. Forewing hyaline, veins brown with small whitish spots.

Hind femur with apical setal formulae 2+0.

Male basal abdominal apodemes with dorsal pair fairly small, widely spaced, ventral pair elongate.

Male genitalia with dorsal transverse region of pygophore triangular-shaped (arrowed in Fig. 95). Tenth segment solidly attached to pygophore, lateral arms with internal marginal ledges, apices bifurcate. Style with apical process tapered to acute upturned apex, ventral margin serrate subapically. Aedeagus with shaft strongly curved dorsally, posterior margin abruptly narrowed subapically in lateral aspect.

Female genitalia with second valvulae as in Fig. 99.

Material examined

Holotype ♂, **Kenya**: Mtito Andei, 16.i.1948 (*N. A. Weber*) (AMNH).

Paratypes. **Kenya**: 1 ♀, same data as holotype (BMNH); 1 ♂, Makindu, Mac Arthur, iv.1937 (BMNH).

Remarks. This species can be distinguished by the small whitish spots on the veins of the forewings and the narrow apical region of the aedeagus. Its relationship to other members of the genus is unclear; although the male genitalia are similar to those of *mopanei* and related species the setal formula at the apex of the hind femur is 2+0 rather than 2+1 (see generic remarks).

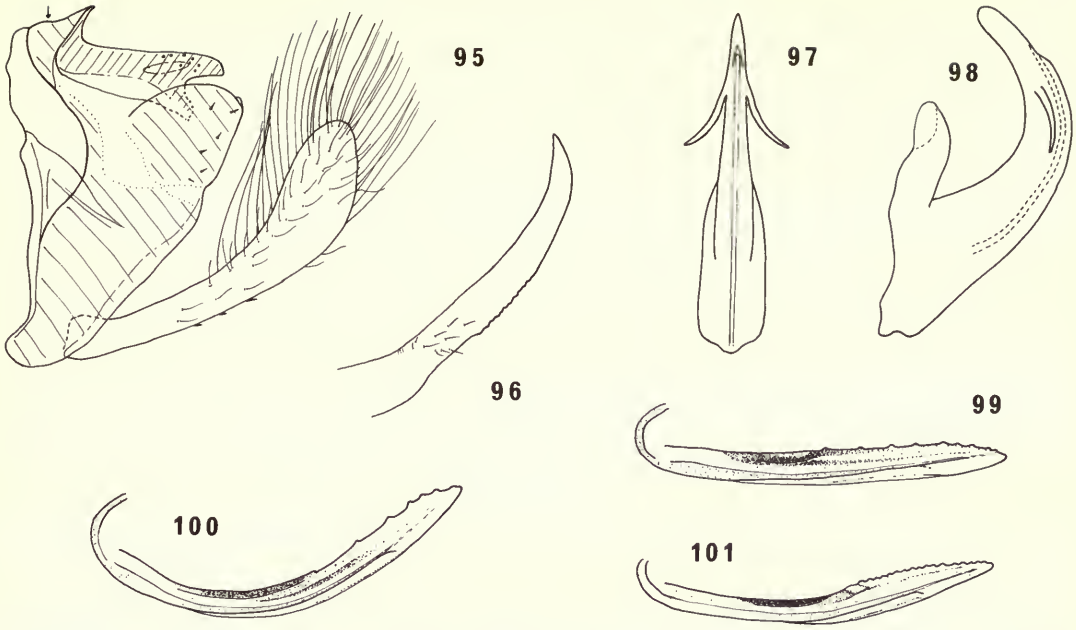
Theronopus mopanei (Webb) comb. n.

(Fig. 100)

Idioscopus mopanei Webb, 1976: 323, figs 184–195. Holotype ♂, Botswana (BMNH) [examined].

Material examined

Rhodesia: 1 ♂, 1 ♀, Victoria Fall Nat. Pk (USNM). Botswana: 3 ♂, 1 ♀ (type-series), Makarikari Pans,



Figs 95–101 *Theronopus* species. 95–99, *T. mtitoensis*. (95) male genital capsule; (96) apex of left style; (97, 98) aedeagus; (99) second valvulae. 100, *T. mopanei*, second valvulae. 101, *T. mimicus*, second valvulae.

20°08″S, 25°32′E, on *Colophospermum mopane* (BMNH). **Angola**: 2 ♂, 1 ♀, Capangombe (WSM). **South West Africa**: 1 ♂, Onguma Fm, 88 km NW. Tsumeb, on *Diospyros mespiliformis* (BMNH). **South Africa**: 19 ♂, 2 ♀, Heidelberg, Grootvaderspis; 1 ♂, 1 ♀, Messina (all US); 1 ♂, Kruger Nat. Pk; 4 ♂, 6 ♀, Dendron; 1 ♂, 2 ♀, Olifants River, Kurt Steyn Bridge (all NCP).

Remarks. This species has been recorded on *Colophospermum mopane* in Botswana and *Diospyros mespiliformis* in South West Africa.

Theronopus spicatus (Webb) comb. n.

Idioscopus spicatus Webb, 1976: 325, figs 196–198. Holotype ♂, Nigeria (BMNH) [examined].

Material examined

Gambia: 1 ♂, 4 ♀, 1 km E. Tendeba Camp, nr R. Gambia (MZE). **Nigeria**: 1 ♂, 1 ♀, 2 ex. (type-series), Zaria, Samaru (BMNH). **Niger**: 7 ♂, 6 ♀, Niamey (RL). **Zaire**: 1 ♂, Elisabethville (IRSNB).

Remarks. This species is tentatively regarded as distinct from *mopanei*, having a more northerly distribution and a subapical ventral tooth on the style.

Theronopus robustus (Webb) comb. n.

Idioscopus robustus Webb, 1976: 326, figs 199–205. Holotype ♂, South Africa (BMNH) [examined].

Material examined

Angola: 1 ♂, 1 ♀, Rocados, 1080 m (BMNH). **South Africa**: 3 ♂ (part of type-series), 1 ♀, Port St John (BMNH; US); 1 ♂ (paratype), 1 ♀, Natal, Weenen (BMNH).

Theronopus loratus (Webb) comb. n.

Idioscopus loratus Webb, 1976: 327, figs 206–210. Holotype ♂, Botswana (BMNH) [examined].

Material examined

Botswana: 1 ♂ (holotype), Kuke Pan, 20°59′S; 22°25′E (BMNH). **South West Africa:** 1 ♂, 1 ♀, Abachaus, Otjwarongo Dist. (TM). **South Africa:** 4 ♂, 1 ♀ Messina (US).

Theronopus mimicus (Webb) comb. n.

(Fig. 101)

Idioscopus mimicus Webb, 1976: 327, figs 211–221. Holotype ♂, South West Africa (BMNH) [examined].

Material examined

South West Africa: 2 ♂, 2 ♀ (type-series), Kombat (BMNH); 4 ♂, 3 ♀, Abachaus, Otjivarongo (WSM; RL); 1 ♀, Abachaus, Damaraland; 1 ♀, Abachaus (both TM); 1 ♀, Tsumeb, Otjikotoberg (WSM).

Theronopus aethiopicus (Heller & Linnavuori) comb. n.

Idiocerus aethiopicus Heller & Linnavuori, 1968: 24, figs 12–14. Holotype ♀, Ethiopia (SMNS) [examined].

Material examined

Ethiopia: 1 ♀ (holotype), Kalaffo (Ogaden) (SMNS).

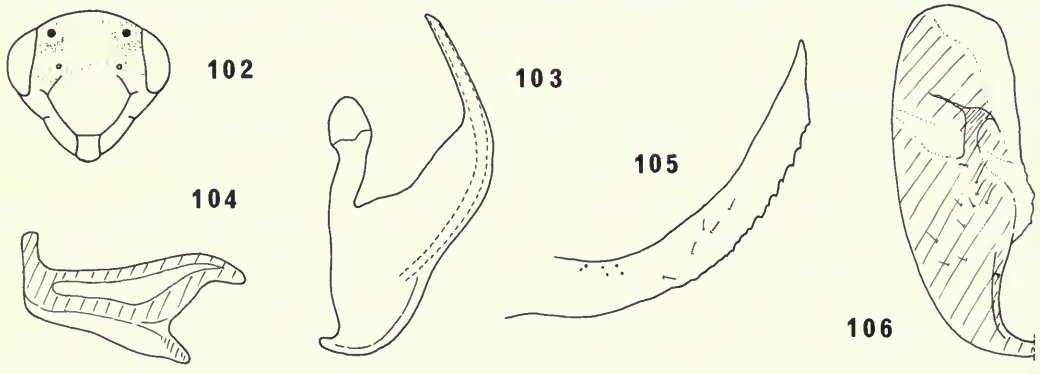
Theronopus ohopohoensis (Linnavuori) comb. n.

(Figs 102–106)

Idiocerus ohopohoensis Linnavuori, 1961: 455, fig. 1D. Holotype ♂, South West Africa (MZE) [examined].

Material examined

South West Africa: 1 ♂ (holotype), Kaokoveld, Anabib (Orupembe), 33 m W. Ohopoho (MZE).



Figs 102–106 *Theronopus ohopohoensis*. 102, face; 103, aedeagus; 104, male Xth segment; 105, apex of left style; 106, left side of male pygophore, posterior view.

PANDACERUS gen. n.

Type-species: *Idioscopus sinuatus* Webb.

Pale to brownish yellow; with or without a spot on vertex near each eye and a pair of basal triangles on scutellum, dark brown.

Head 1·12–1·22 times as wide as pronotum, shagreened. Vertex 4·0–5·3 times as wide as medial length; slightly shorter to slightly longer medially than length next to eyes. Face 1·15 times as wide as long, shagreened; eyes moderately large, inner margin of eye 0·83 times perpendicular length of face below eyes; interocellar width 2·4 times ocellocular width; laterofrontal sutures extended approximately one-half distance to corresponding ocellus, more or less straight; lora separated from facial margin throughout length; clypellus with sides concave, apex wider than base; rostrum extended to near hind coxae; male antenna expanded apically. Pronotum shagreened. Scutellum slightly shorter than combined length of pronotum and vertex, shagreened. Forewing with first subapical cell open, second closed, third present. Hind femur with apical setal formula 2+1; hind tibia flattened with 11–19 spines in row 1, six to seven spines in row 2 and six to eight spines in row 3, distel spines of row 2 without a basal process.

Male abdomen with dorsal and ventral basal apodemes lobe-like.

Male genitalia with Xth segment loosely attached to pygophore, lateral arms with apices extended ventrally. Subgenital plates narrowly spatulate in lateral aspect or sometimes tapered distally; ventral and or dorsal margin sometimes strongly sinuate; numerous long fine marginal setae distally. Connective Y-shaped with a dorsomedial keel. Style with apical process expanded apically in lateral aspect; preapical lobe lateral with relatively long fine setae on inner surface. Aedeagus with shaft curved dorsally, elongate, cylindrical, tapered to apex, with or without a pair of subapical ventrally directed processes, gonopore subapical on posterior surface; basal apodeme moderately long to long.

Female genitalia with first valvulae transversely striate dorsolaterally. Second valvulae moderately long and narrow to short and broad in lateral aspect; several to numerous prominent teeth over distal one-third to two-thirds of valvulae; sclerotized region basad of teeth situated at dorsal margin; dorsal hyaline region present.

DISTRIBUTION. Ethiopia, South Africa, Seychelles.

REMARKS. This genus can be distinguished by the following combination of characters: male antennae expanded apically, styles with a lateral preapical lobe and apical region expanded. The species *scotti*, from the Seychelles, is tentatively included in this genus by the above characters but has the lora extended or nearly extended to the facial margin over their ventral third and the vertex transversely striate rather than shagreened.

Key to the species of *Pandacerus*

1	Vertex with a brown spot near each eye	2
–	Vertex not as above	7
2	Male	3
–	Female	5
3	Aedeagal processes long	4
–	Aedeagal process short	***flavicostus*** (Webb) (p. 241)
4	Subgenital plate with dorsal and ventral margins strongly sinuate	***sinuatus*** (Webb) (p. 241)
–	Subgenital plate with dorsal and ventral margins weakly sinuate	***aethiopicus*** (Webb) (p. 242)
5	Second valvulae short and broad (Fig. 113)	6
–	Second valvulae moderately long and broad (Fig. 112)	***aethiopicus*** (Webb) (p. 242)
6	Face with a brown transverse band at level of ocelli	***sinuatus*** (Webb) (p. 241)
–	Face not as above, with a pair of brown spots at level of antenna	***flavicostus*** (Webb) (p. 241)
7	Vertex shagreened. Aedeagus with processes	***capeneri*** sp. n. (p. 242)
–	Vertex transversely striate. Aedeagus without processes. (Seychelles)	***scotti*** (Distant) (p. 241)

Pandacerus scotti (Distant) comb. n.

Idiocerus scotti Distant, 1917: 307. Lectotype ♂, SEYCHELLES (BMNH), designated by Webb, 1976: 297 [examined].
Idioscopus scotti (Distant) Webb, 1976: 296, figs 1–13.

MATERIAL EXAMINED
Seychelles: 3 ♂, 4 ♀ (type-series), Silhouette (BMNH); 2 ♀ (no further data) (BMNH).

Pandacerus sinuatus (Webb) comb. n.

(Fig. 113)

Idioscopus sinuatus Webb, 1976: 302, figs 38–47. Holotype ♂, SOUTH AFRICA (BMNH) [examined].

MATERIAL EXAMINED
South Africa: 21 ♂, 19 ♀, Katberg; 1 ♂, Swellendam Distr., Grootvaterbosch, nr Heidelberg; 1 ♂, French Hoek, 64 km from Cape Town (all type-series) (BMNH; 1 ♂, 1 ♀ PPRI).

Pandacerus flavicostus (Webb) comb. n.

Idioscopus flavicosta Webb, 1976: 299, figs 27–37. Holotype ♂, SOUTH AFRICA (BMNH) [examined].

MATERIAL EXAMINED
South Africa: 2 ♂, 12 ♀ (type-series), Katberg (BMNH); 1 ♂, Rustenburg; 1 ♂, 3 ♀, Rosslyn, Tul.; 1 ♂, 1 ♀, East London, Gonubie; 2 ♀, Mooirivier (all US); 1 ♂, Natal (RL).

Pandacerus aethiopicus (Webb) comb. n.

(Fig. 112)

Idioscopus aethiopicus Webb, 1976: 299, figs 14–26. Holotype ♂, Ethiopia (BMNH) [examined].

Material examined

Ethiopia: 32 ♂, 33 ♀ (type-series) Djem-Djem Forest (BMNH; 1 ♂, 1 ♀ PPRI).

Pandacerus capeneri sp. n.

(Figs 107–111)

Length: ♂, 4·4 mm; ♀, 5·0 mm.

Head and thorax yellow to brownish yellow. Forewing brownish hyaline, veins concolorous with wing or whitish; midlength of wing adjacent to costal margin with a brown patch.

Male genitalia with subgenital plates narrowly spatulate in lateral aspect, dorsal and ventral margins not noticeably sinuate. Styles with apical process expanded distally in lateral aspect, ventral margin crenulate basally. Shaft of aedeagus with a pair of subapical processes, extended to slightly beyond midlength of shaft; basal apodeme of aedeagus moderately long.

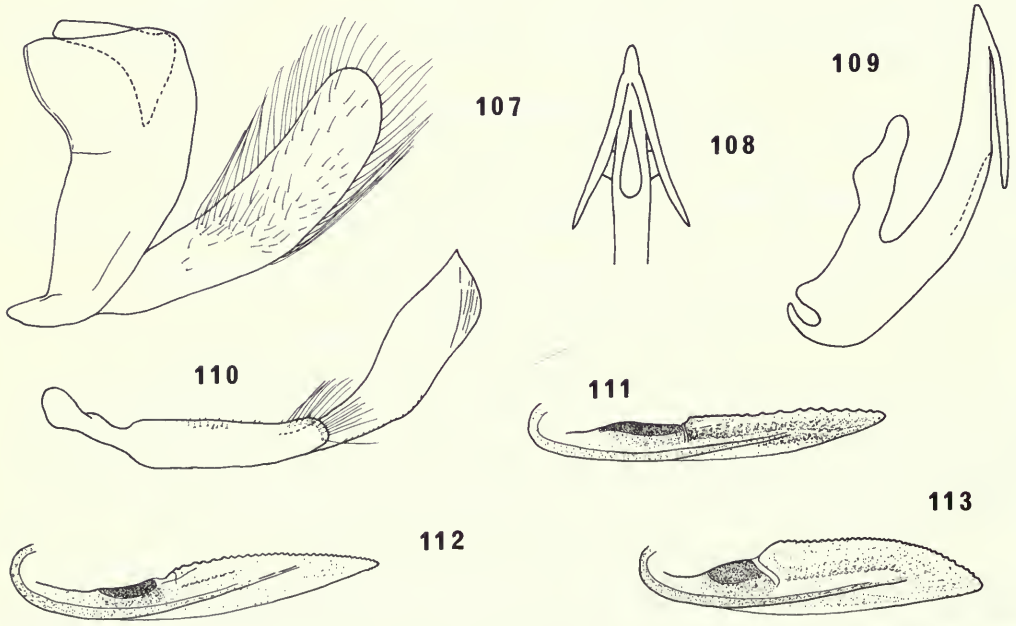
Fmelae genitalia with second valvulae moderately long and narrow; several teeth over slightly more than distal half of valvulae.

Material examined

Holotype ♂, **South Africa**: Untentweni, 14.x.1969 (*A. L. Capener*) (US).

Paratypes. **South Africa**: 3 ♂, 4 ♀, same data as holotype (US; BMNH); 1 ♀, Eshowe, 6–31.v.1926 (*R. E. Turner*) (BMNH).

Remarks. This species is similar to *scotti* in the shape of the subgenital plates and styles and in lacking a pair of brown spots on the vertex, but differs in having the vertex shagreened and a pair of subapical processes on the aedeagus as in other members of the genus.



Figs 107–113 *Pandacerus* species. 107–111, *P. capeneri*. (107) male genital capsule; (108) apex of aedeagus; (109) aedeagus; (110) style; (111) second valvulae. 112, *P. aethiopicus*, second valvulae. 113, *P. sinuatus*, second valvulae.

PRETIOSCOPUS gen. n.

Type-species: *Idioscopus clavosignatus* Webb.

Yellow, sordid yellow or stramineous, rarely nearly entirely dark brown, sometimes tinged with green or orange or with a spot on vertex near each eye and a pair of basal triangles of scutellum, dark brown, or a pair of dark brown anterior spots on pronotum; with or without a spot near each ocellus in female; male antenna dark brown medially or distally.

Head 1·13 times as wide as pronotum. Vertex 3·7–5·0 times as wide as medial length; medial length equal to or longer than length next to eyes; shagreened or finely transversely striate. Face 1·08–1·15 times as wide as long, shagreened; eye moderately large, inner margin of eye 0·90 times perpendicular length of face below eyes; interocellar width 2·5 times ocellocular width; laterofrontal sutures extended approximately one-half distance to corresponding ocellus, more or less straight; lora separated from facial margin throughout length; clypellus with sides concave, apex wider than base; rostrum extended to mid coxae; male antenna sometimes expanded apically. Pronotum shagreened. Scutellum slightly shorter to slightly longer than pronotum, shagreened. Forewing with first and second subapical cells closed, third subapical cell present. Hind femur with apical setal formula 2+1; hind tibia flattened, with 12–17 spines in row 1, 6–7 spines in row 2 and 5–7 spines in row 3, distal spines of row 2 without a basal process.

Male dorsal and ventral basal abdominal apodemes lobe-like, dorsal pair sometimes reduced.

Male genitalia with Xth segment loosely attached to pygophore; apices of Xth segment broad or narrow in lateral aspect. Subgenital plates elongate, spatulate in lateral aspect, numerous long fine marginal setae distally. Connective Y-shaped with dorsomedial keel. Styles with apical process elongate, curved dorsally and tapered to apex, ventral margin crenulate subapically; preapical lobe lateral, few relatively long fine setae on medial surface. Aedeagus with shaft elongate, cylindrical, curved dorsally and tapered to apex, with or without pair of apical or subapical processes, gonopore apical on posterior surface; basal apodeme elongate.

Female genitalia with first valvulae transversely striate dorsolaterally. Second valvulae moderately long and narrow or elongate; few prominent teeth distally with or without several fine, more basal teeth; sclerotized region basad of teeth situated at or slightly below dorsal margin; dorsal hyaline region present or absent.

DISTRIBUTION. Tropical Africa.

REMARKS. This genus can be distinguished by the following combination of characters: forewings with the first subapical cell closed and the male antennae marked with dark brown medially or distally, and sometimes expanded apically. The genus can be divided into the *flavosignatus*-group and the *ghanaensis*-group (see characters given in key, couplet 1). The former group can be subdivided into the *flavosignatus* species complex and the *nigeriensis* species complex (see characters given in key, couplet 2), both complexes having a pair of brown anterior spots on the pronotum in some species (see couplets 3 and 9 in key).

Key to the species of *Pretioscopus*

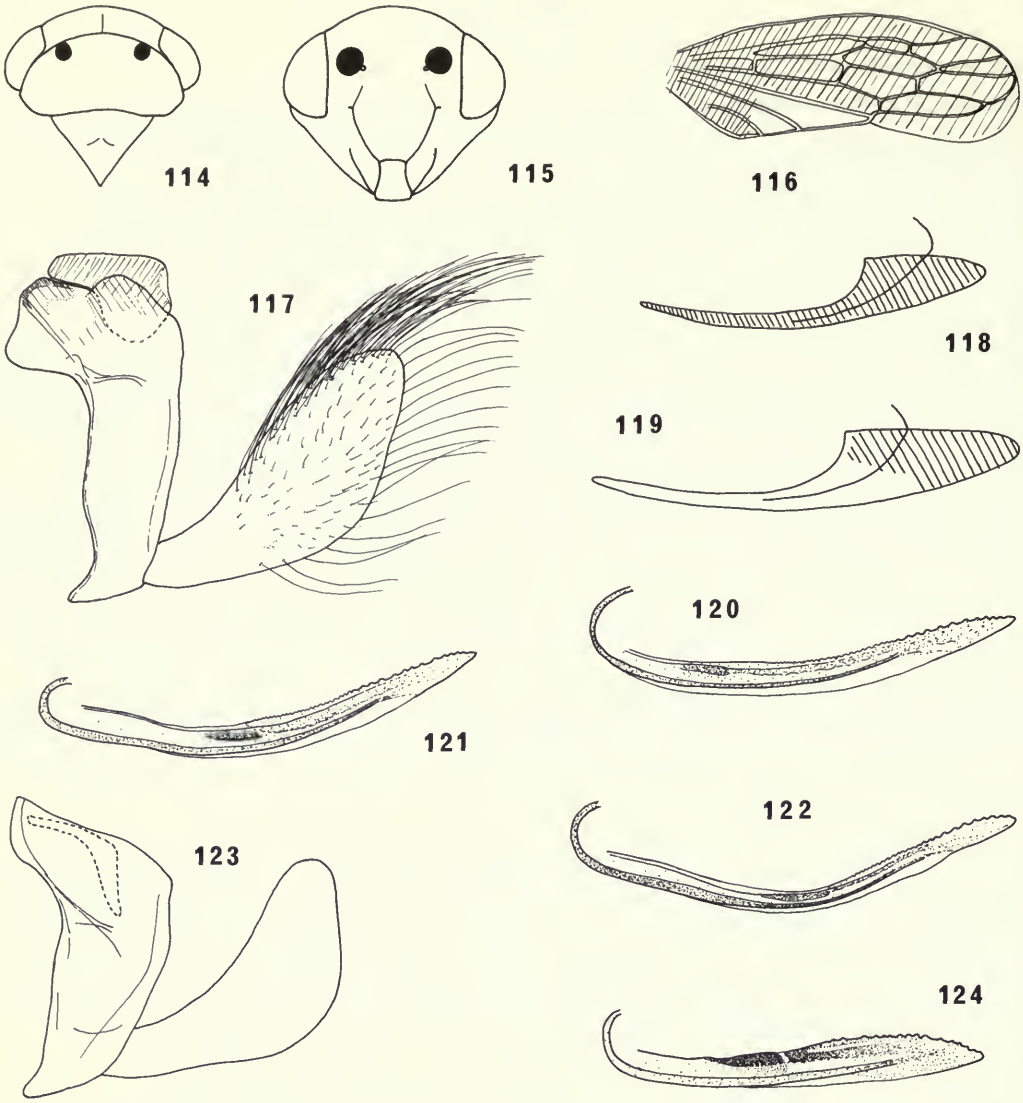
Females of *flavocephalus, binotatus, caprilei, macrosetus, longicornis* and *pilosus* are unknown.

1 Vertex without a brown spot near each eye; scutellum without pair of brown basal triangles; pronotum with or without a pair of brown anterior spots; face (female) sometimes with a brown spot near each ocellus. Male Xth segment with apices broad in lateral aspect (Fig. 117); aedeagus with or without a pair of apical processes. Second valvulae of ovipositor with the more anterior teeth fine, dorsal sclerotized region basad of teeth situated below dorsal margin (Figs 120–122) ..... ***flavosignatus*-group** 2

– Vertex with a brown spot near each eye; scutellum with a pair of brown basal triangles; pronotum and face not marked as above. Male Xth segment with apices narrow in lateral aspect (Fig. 123); aedeagus with a pair of subapical processes. Second valvulae of ovipositor without fine anterior teeth, dorsal sclerotized region basad of teeth situated at dorsal margin (Fig. 124) ..... ***ghanaensis*-group** 13

2 Vertex finely and transversely striate. Female without a dark brown spot on ocellocular region. Male basal dorsal abdominal apodemes reduced. Aedeagus with processes. Second valvulae with dorsal sclerotized region basad of teeth situated anteriorly (Fig. 120) ***flavosignatus*-complex** 3

– Vertex shagreened. Female with a dark brown spot on ocellocular region (Fig. 115). Male basal



Figs 114–124 *Pretioscopus* species. 114, *P. africanus*, face. 115, *P. viridiclavus*, face. 116, *P. flavosignatus*, forewing. 117, *P. medleri*, male genital capsule. 118, *P. linnavuorii*, third valvulae. 119, *P. viridiclavus*, third valvulae. 120, *P. africanus*, second valvulae. 121, *P. quadrimaculatus*, second valvulae. 122, *P. medleri*, second valvulae. 123, *P. pilosus*, male pygophore, Xth segment and subgenital plate (setae omitted). 124, *P. ghanaensis*, second valvulae.

dorsal abdominal apodemes prominent. Aedeagus without processes. Second valvulae with sclerotized region basad of teeth situated near mid-length of valvulae (Figs 121, 122)
***nigeriensis*-complex** 9

3 Pronotum with a pair of dark brown anterior spots (Fig. 114) 4
– Pronotum not as above (females unknown) 7
4 Mainly dark brown, forewing with distal half of clavus yellow (Fig. 116)
flavosignatus (Webb) (p. 245)
– Mainly yellow (females unknown) 5
5 Subgenital plates with a group of moderately long stout setae apically .. ***macrosetus*** (Webb) (p. 245)
– Subgenital plates not as above 6
6 Aedeagal processes short ..... ***africanus*** (Webb) (p. 246)

– Aedeagal processes moderately long ..... ***binotatus*** (Webb) (p. 246)
7 Aedeagal shaft and processes elongate (Fig. 127) ..... ***longicornis*** sp. n. (p. 245)
– Aedeagus not as above 8
8 Subgenital plates with a group of fairly short marginal setae dorsoapically ***flavocephalus*** (Webb) (p. 246)
– Subgenital plates not as above ..... ***caprilei*** (Webb) (p. 246)
9 Pronotum and face with a pair of dark brown spots (Fig 114, 115). Second valvulae as in Fig. 121. Third valvulae dark brown apically (Fig. 119) ..... ***quadrimaculatus*** (Webb) (p. 246)
– Pronotum with or without a pair of dark brown spots; face without a pair of dark brown spots or if present (female) second valvulae as in Fig. 122 and third valvulae entirely dark brown (Fig. 118) 10
10 Pronotum with a pair of dark brown spots (Fig. 114) 11
– Pronotum not as above 12
11 Aedeagus with gonopore short, situated at apex of shaft. Subgenital plates narrow apically (Fig. 117). Female 3·6 mm ..... ***medleri*** (Webb) (p. 247)
– Aedeagus with gonopore elongate, extended to near midlength of shaft. Subgenital plates broadly rounded apically. Female 4·0–4·2 mm ..... ***linnavuorii*** (Webb) (p. 247)
12 Styles sharply curved dorsally over apical one-quarter. Expanded apex of third valvulae with approximately two-thirds its length beyond pygophore (Fig. 119)..... ***viridiclavus*** (Webb) (p. 247)
– Styles evenly curved dorsally. Expanded apex of third valvulae with approximately half its length beyond pygophore ..... ***nigeriensis*** (Webb) (p. 246)
13 Subgenital plates with long ventral marginal setae at midlength and apex of plates (absent subapically on plates) ..... ***ghanaensis*** (Webb) (p. 247)
– Subgenital plates with long ventral marginal setae along entire distal half of plates ***pilosus*** (Webb) (p. 247)

Pretioscopus flavosignatus (Webb) comb. n.

(Fig. 116)

Idioscopus flavosignatus Webb, 1976: 302, figs 48–60. Holotype ♂, NIGERIA (BMNH) [examined].

MATERIAL EXAMINED

Nigeria: 2 ♂, 1 ♀ (type-series), SE. State, Oban Rest House (BMNH). **Cameroun**: 1 ♀ (paratype) Kumba (RL); 2 ♂, Victoria (CAS). **Angola**: 1 ♀ (paratype), 11 km W. Babela (BMNH).

Pretioscopus longicornis sp. n.

(Figs 125–127)

Length: ♂, 4·0 mm.

Head and thorax yellow; forewing brownish hyaline tinged with orange; male antenna dark brown subapically.

Vertex finely and transversely striate.

Male genitalia with apices of Xth segment broad in lateral aspect, posterior margins produced as a broad lobe. Subgenital plates broadly rounded apically; a uniseriate row of long fine marginal setae distally. Aedeagal shaft elongate, a pair of elongate apical processes; gonopore apical on posterior surface, short.

MATERIAL EXAMINED

Holotype ♂, **Cameroun**: Nkoemvon, vii.1979 (*D. Jackson*) (BMNH).

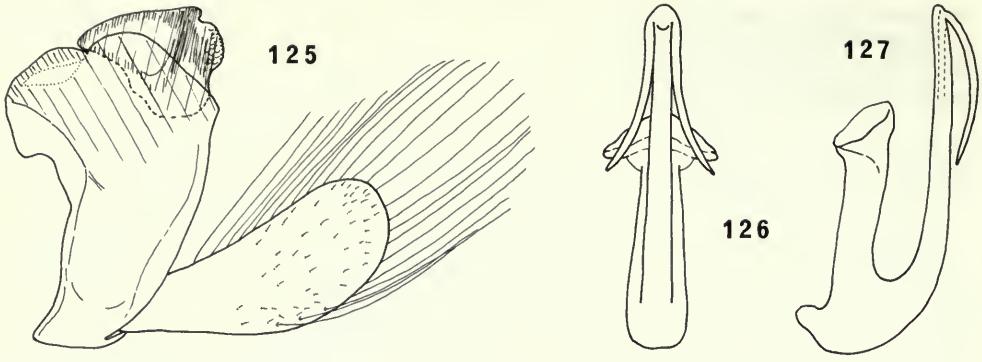
REMARKS. This species is similar to *flavocephala* and *caprilei* in lacking a pair of pronotal spots and having the vertex finely and transversely striate. It differs from these species by its longer aedeagal shaft and processes.

Pretioscopus macrosetus (Webb) comb. n.

Idioscopus macrosetus Webb, 1976: 304, figs 61, 62. Holotype ♂, NIGERIA (BMNH) [examined].

MATERIAL EXAMINED

Nigeria: 1 ♂ (holotype), S.E. State, Ikom, C.R.I.N. (BMNH).



Figs 125–127 *Pretioscopus longicornis*. 125, male genital capsule; 126, 127, aedeagus.

Pretioscopus caprilei (Webb) comb. n.

Idioscopus caprilei Webb, 1976: 304, figs 63–65. Holotype ♂, NIGERIA (BMNH) [examined].

MATERIAL EXAMINED

Nigeria: 2 ♂ (type-series), S.E. State, Ikom, C.R.I.N. (BMNH).

Pretioscopus africanus (Webb) comb. n.

(Figs 114, 120)

Idioscopus africanus Webb, 1976: 306, figs 66–69. Holotype ♂, NIGERIA (BMNH) [examined].

MATERIAL EXAMINED

Liberia: 2 ♂, 4 ♀, Suakoka (USNM). **Nigeria**: 14 ♂, 7 ♀, M.W. State, Udo Forest Res.; 5 ♂, 3 ♀, M.W. State, Benin, Nigerian Oilpalm Res. Inst.; 8 ♂, 5 ♀, S.E. State, Obudu, C.R.; 8 ♂, 3 ♀, S.E. State, Ikom, C.R.I.N.; 7 ♂, S.E. State, Oban Rest House; 1 ♂, Ile-Ife (holotype and paratypes (in part)) (BMNH; RL; USNM). **Central African Republic**: 1 ♂, Bossangoa, Bossembele (paratype) (RL). **Cameroun**: 2 ♂ (paratypes (in part)), Kumba (RL); 6 ♂, 1 ♀, 1 ex., Victoria (Bota) (CAS). **Zaire**: 1 ♂, Ubangi, Nouvelle Anvers (paratype) (MRAC). **Angola**: 2 ♂, 3 ♀ (paratypes (in part)) (MD).

Pretioscopus binotatus (Webb) comb. n.

Idioscopus binotatus Webb, 1976: 306, figs 70, 71. Holotype ♂, NIGERIA (BMNH) [examined].

MATERIAL EXAMINED

Nigeria: 5 ♂ (type-series), S.E. State, Oban Rest House (BMNH).

Pretioscopus flavocephalus (Webb) comb. n.

Idioscopus flavocephalus Webb, 1976: 306, figs 72–75. Holotype ♂, NIGERIA (BMNH) [examined].

MATERIAL EXAMINED

Nigeria: 8 ♂, 11 ♀ (holotype and paratypes (in part)), W. State, Ile-Ife; 1 ♂, W. State, Ife; 1 ♂ (paratype), M.W. State, Benin, Nigerian Oilpalm Res. Inst. (BMNH; RL; USNM).

Pretioscopus nigeriensis (Webb) comb. n.

Idioscopus nigeriensis Webb, 1976: 307, figs 76–82. Holotype ♂, NIGERIA (BMNH) [examined].

MATERIAL EXAMINED

Ivory Coast: 1 ♂, Adiopodoume (paratype) (MRAC). **Nigeria**: 12 ♂, 6 ♀, N.W. State, Udo Forest Res.; 3 ♂, 1 ♀, M.W. State, Benin, Nigerian Oilpalm Res. Inst.; 1 ♂, 2 ♀, S.E. State, Ikon, C.R.I.N.; 3 ♂, S.E. State, Oban Rest House; 6 ♂, 3 ♀, Ile-Ife; 1 ♀, W. State, Effon-Alaiye (holotype and paratypes (in part)) (BMNH; RL; USNM).

Pretioscopus quadrimaculatus (Webb) **comb. n.**

(Fig. 121)

Idioscopus quadrimaculatus Webb, 1976: 309, figs 83, 84. Holotype ♂, Angola (MD) [examined].

Material examined

Angola: 3 ♂, 1 ♀ (type-series) (MD; BMNH; RL).

Pretioscopus viridiclavus (Webb) **comb. n.**

(Figs 115, 119)

Idioscopus viridiclavus Webb, 1976: 309, figs 85–87. Holotype ♂, Zaire 'Congo Belge' (IRSNB) [examined].

Material examined

Zaire: Upemba Nat. Park: 2 ♂, 7 ♀ (holotype and paratypes (in part)), Munoi bif. Lupiala, 890 m; 3 ♂, 4 ♀, Kaswabilenga, 700 m; 6 ♂, (including paratype) 1 ♀, Riv. Lupiala, 700 m; 1 ♂ (paratype), 1 ♀, Georges de la Pelenge, 1150 m; 1 ♂, Kabwoes/Muye, 1320 m (all IRSNB; BMNH; RL).

Pretioscopus medleri (Webb) **comb. n.**

(Figs 117, 122)

Idioscopus medleri Webb, 1976: 311, figs 88–92. Holotype ♂, Nigeria (BMNH) [examined].

Maaterial examined

Nigeria: 7 ♂, 1 ♀, S.E. State, Oban Rest House; 3 ♂, 1 ♀, S.E. State, Ikom, C.R.I.N.; 1 ♂, M.W. State, Udo Forest Res. (all type-series) (BMNH); 1 ♂, W. State, Ile-Ife (USNM). **Cameroun**: 5 ♂, 3 ♀, Victoria (Bota) (CAS).

Pretioscopus linnavuorii (Webb) **comb. n.**

(Fig. 118)

Idioscopus linnavuorii Webb, 1976: 311, figs 93–97. Holotype ♂, Nigeria (BMNH) [examined].

Material examined

Ivory Coast: 1 ♂ (paratype) Adiopodoumé (MRAC). **Nigeria**: 4 ♂, 3 ♀, W. State, Ile-Ife; 2 ♂, Udo Forest Res.; 1 ♂, 1 ♀, S.E. State, Oban Rest House; 1 ♂, 2 ♀ (holotype and paratypes (in part)), S.E. State, Ikom, C.R.I.N. (BMNH). **Cameroun**: 9 ♂, 4 ♀, Victoria (Bota) (CAS).

Pretioscopus ghanaensis (Webb) **comb. n.**

(Fig. 124)

Idioscopus ghanaensis Webb, 1976: 312, figs 98–110. Holotype ♂, Ghana (BMNH) [examined].

Material examined

Ghana: 1 ♂, 2 ♀ (type-series), E. Region, Accra, Legon (BMNH). **Zambia**: 1 ♂, Lusaka (BMNH).

Remarks. The specimen from Zambia has the position of the aedeagal processes as in *pilosus*. This character cannot therefore be used to separate the two species as was indicated in their original descriptions; they are tentatively regarded as distinct on the difference in setosity of the sub-genital plates (see key).

Pretioscopus pilosus (Webb) **comb. n.**

(Fig. 123)

Idioscopus pilosus Webb, 1976: 313, figs 111–118. Holotype ♂, Zimbabwe (BMNH) [examined].

Material examined

Zimbabwe: 1 ♂ (holotype), Bulawayo (BMNH).

GROOTONIA gen. n.

Type-species: *Grootonia mella* sp. n.

Yellow, sordid yellow or stramineous. Vertex with a dark brown anterior spot near each eye. Pronotum with or without brown mottling. Scutellum with a pair of dark brown basal triangles. Forewings yellow to brownish hyaline, veins concolorous with wing or mainly brown.

Head 1·15 times as wide as pronotum, shagreened. Vertex 3·5–5·9 times as wide as medial length; slightly shorter medially than length next to eyes. Face 1·07–1·10 times as wide as long; eyes large, inner margin of eyes approximately equal in length to perpendicular length of face below eyes; interocellar width 2·2 times ocellocular width; laterofrontal sutures extended to corresponding ocellus, more or less straight; lora separated from facial margin throughout length; clypellus with sides concave, apex wider than base; rostrum extended to middle or hind coxae. Pronotum shagreened. Scutellum slightly shorter than combined length of pronotum and vertex, shagreened. Forewings with first subapical cell open, second closed, third present. Hind femur with apical setal formula 2+1. Hind tibia flattened, with 18–23 spines in row 1, six to eight spines in row 2 and eight to nine spines in row 3; distal spines of row 2 without a basal process.

Male dorsal and ventral basal abdominal apodemes lobe-like.

Male genitalia with Xth segment with anterior transverse region absent; lateral arms very broad in lateral aspect, solidly attached to pygophore anteriorly. Subgenital plates elongate, narrowly spatulate in lateral aspect, several long fine marginal setae distally. Connective Y-shaped with dorsomedial keel. Style with apical process elongate, curved dorsally, slightly expanded and tapered to apex in lateral aspect; preapical lobe ventral. Aedeagus with shaft elongate, cylindrical, directed dorsally and tapered to apex, a pair of subapical processes directed ventrally or laterally, sometimes with an additional pair of very small processes subapically; gonopore apical on posterior surface; basal apodeme short to moderately long.

Female genitalia with first valvulae transversely striate dorsolaterally. Second valvulae elongate, numerous very fine teeth over distal half of valvulae, anterior teeth elevated; sclerotized region basad of teeth situated at dorsal margin; dorsal hyaline region present.

DISTRIBUTION. Kenya, Botswana, South Africa.

REMARKS. This genus can be distinguished by the following combination of characters: the long laterofrontal sutures and the shape of the male Xth segment and female second valvulae, as noted above.

Key to the species of *Grootonia*

Females of *knighti* are unknown.

1 Antennal pits marked with dark brown; veins of forewing mainly brown 2
– Antennal pits not marked with brown; veins of forewing yellowish hyaline ***kenyaensis*** (Webb) (p. 249)
2 Aedeagal processes short..... ***knighti*** (Webb) (p. 249)
– Aedeagal processes elongate, sometimes with an additional small pair of processes (Fig. 129) ***mella*** sp. n. (p. 248)

Grootonia mella sp. n.

(Figs 128–131)

Length: ♂, 4·6 mm; ♀, 4·9 mm.

Pale yellow. Head with a brown spot on vertex near each eye; antennal pits dark brown, female with a medial brown patch on clypeus. Pronotum heavily mottled with brown. Scutellum with brown basal triangles. Veins of forewing brown with a whitish patch on cubital vein near midlength of wing and at junction of cubital vein and first apical cell.

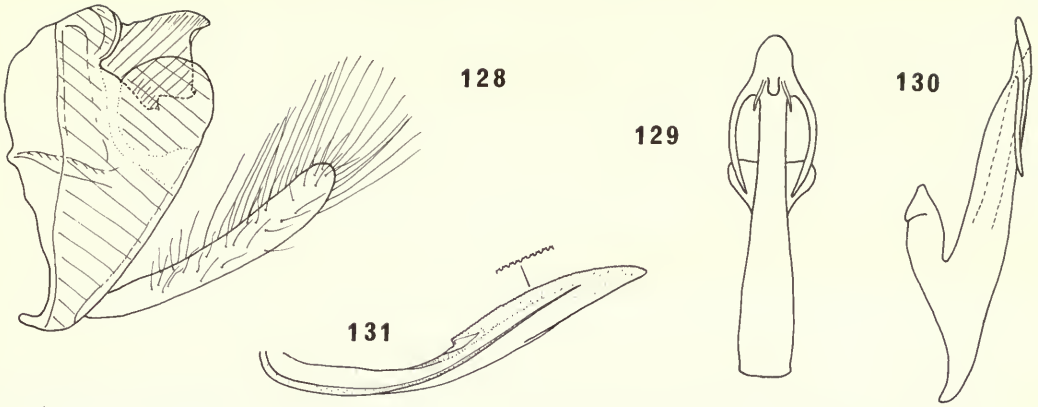
Male genitalia with socle region of aedeagus relatively narrow basally; aedeagal shaft with apex compressed anteroposteriorly, pair of elongate ventrally directed subapical processes, arising anterolaterally, sometimes a more posterior very small process arising near base of each elongate process; basal apodeme of aedeagus relatively short.

Female genitalia as in generic description.

MATERIAL EXAMINED

Holotype ♂, **South Africa**: Messina, xi.1971 (*H. D. Catling*) (US).

Paratypes. **South Africa**: 1 ♂, 1 ♀, Kurt Steyn Bridge, Olifants River, 13.i.1965 (*M. Hoffmann*)



Figs 128–131 *Grootonia mella*. 128, male genital capsule; 129, 130, aedeagus; 131, second valvulae.

(BMNH); 1 ♂, Malelane, 3–5.xii.1963 (*L. Vári*) (TM); 1 ♀, Nelspruit, 8.xi.1966 (*P. Paliatseas*) (NCI); 2 ♀, Dendron, Claudius Hoop, 22.ix.1965 (*M. Johannsmeier*) (NCI); 1 ♀, Pafuri, 17.i.1965 (*A. L. Capener*) (NCI).

REMARKS. This species can be distinguished by its brown markings and the shape of the aedeagus, as noted above.

Grootonia knighti (Webb) comb. n.

Idioscopus knighti Webb, 1976: 320, figs 161–172. Holotype ♂, BOTSWANA (BMNH) [examined].

MATERIAL EXAMINED

Botswana: 4 ♂ (type-series), Kuke Pan, 20°59′S, 22°25′E (BMNH).

Grootonia kenyaensis (Webb) comb. n.

Idioscopus kenyaensis Webb, 1976: 323, figs 173–183. Holotype ♂, KENYA (BMNH) [examined].

MATERIAL EXAMINED

Kenya: 1 ♂ (holotype), Chyulu Hills, 1680 m (BMNH); 1 ♂, Meru (BMNH).

CAFIXIA gen. n.

Type-species: *Idiocerus hewitti* Cogan.

Yellow; vertex with a dark brown anterior spot near each eye; scutellum with a pair of dark brown basal triangles.

Head 1·25 times as wide as pronotum. Vertex 3·7–4·7 times as wide as medial length; of uniform length or slightly longer medially than length next to eyes, finely transversely striate. Face 1·12 times as wide as long, shagreened below ocelli, finely transversely striate above ocelli; eyes large, inner margin of eyes 0·90 times perpendicular length of face below eyes; interocellar width 3·3 times ocellocular width; laterofrontal sutures extended to point adjacent to inner margin of corresponding ocellus, more or less straight; lora separated from face throughout length; clypellus with sides concave, apex wider than base; rostrum extended to mid coxae. Pronotum finely transversely striate. Scutellum slightly shorter than combined length of pronotum and vertex, finely rugose, brown basal triangles shagreened. Forewings with first subapical cell open, second closed, third present. Hind femur with apical setal formula 2+1. Hind tibia flattened, with 14–18 spines in row 1, 6–7 spines in row 2 and 6–9 spines in row 3; distal spines of row 2 with a strong basal process.

Male dorsal and ventral basal abdominal apodemes lobe-like.

Male genitalia with Xth segment loosely attached to pygophore, lateral arms only slightly expanded posteriorly in lateral aspect. Subgenital plates narrowly spatulate in lateral aspect, few moderately long fine marginal setae distally. Connective Y-shaped with a dorsomedial keel. Style with apical process elongate, tapered to narrow upturned apex, ventral margin crenulate subapically; preapical lobe indistinct. Aedeagus with shaft elongate, cylindrical, curved dorsally and tapered to apex, a pair of subapical ventrally directed lateral processes, gonopore subapical on posterior surface; basal apodeme elongate.

Female genitalia with first valvulae transversely striate dorsolaterally. Second valvulae elongate, few prominent teeth distally; sclerotized region basad of teeth indistinct, dorsal hyaline region absent.

DISTRIBUTION. Angola, South Africa.

REMARKS. This genus can be distinguished by the following combination of characters: vertex and pronotum with fine transverse striations and the scutellum finely rugose.

Cafixia hewitti (Cogan) **comb. n.**

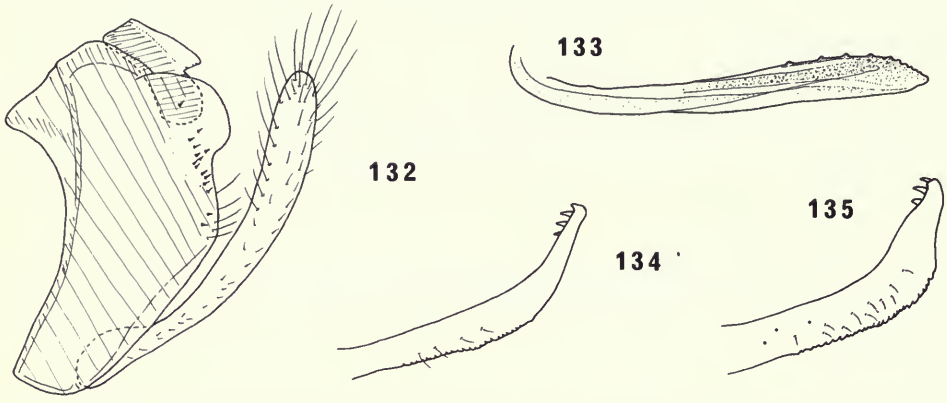
(Figs 132–135)

Idiocerus hewitti Cogan, 1916: 180, figs 3a–c. Holotype ♀, SOUTH AFRICA (AM) [examined].
Idioscopus hewitti (Cogan) Webb, 1976: 319, figs 149–160.

MATERIAL EXAMINED

Angola: 4 ♂, 3 ♀, Dolondolo, 13°49′S, 13°07′E; 1 ♀, Capangombe, 15°05′S, 13°10′E (all SM). **South Africa**: 1 ♂ (holotype), Grahamstown (AM), 1 ♂ Grahamstown (US); 1 ♀, Cathcart (US); 2 ♂, 1 ♀ Mkuzi (NCI); 1 ♂, Urnkomaas (RL); 3 ♂, 1 ♀, Port St John; 3 ♀, Weenen; 1 ♀, Katberg, 1200 m (all BMNH).

REMARKS. There is some variation in the style apex (Figs 134, 135).



Figs 132–135 *Cafixia hewitti*. 132, male genital capsule; 133, second valvulae; 134, apex of left style, South Africa, Urnkomaas; 135, same, Angola.

RHUSOPUS **gen. n.**

Type-species: *Idiocerus cuneiformis* Naudé.

Head and thorax yellow to sordid yellow, sometimes tinged with green; vertex with a dark brown anterior spot near to each eye; antennal pits dark brown; scutellum with a pair of dark brown basal triangles. Forewings yellow to brownish hyaline, veins concolorous with wing, whitish or yellow; a brown patch sometimes present at midlength of corium.

Head 1·25 times as wide as pronotum. Vertex 4·5–5·3 times as wide as medial length; of uniform length or slightly shorter medially than length next to eyes; finely and transversely striate. Face 1·25 times as wide as long, shagreened; eyes large, inner margin of eyes 0·90 times perpendicular length of face below eyes; interocellar width twice ocellocular width; laterofrontal sutures extended one-quarter distance to corresponding ocellus, more or less straight; lora separated from facial margin throughout length; clypellus with sides concave, apex wider than base; rostrum extended to near hind coxae. Pronotum shagreened. Scutellum slightly shorter than combined length of prontoum and vertex, shagreened. Forewings with first subapical cell open, second closed, third present. Hind femur with apical setal formula 2+1. Hind tibia flattened, with 10–12 spines in row 1, five spines in row 2 and four spines in row 3; distal spines of row 2 with a weak basal process.

Male dorsal and ventral basal abdominal apodemes lobe-like.

Male genitalia with Xth segment fused to pygophore anteriorly, lateral arms narrow throughout length in lateral aspect, with an internal marginal ledge. Subgenital plates narrowly spatulate in lateral aspect,

several long fine marginal setae dorsally and apically and a few moderately long spine-like setae ventrally. Connective Y-shaped with a dorsomedial keel. Style with apical process elongate, apex upturned foot-like, ventral heel serrate; preapical lobe lateral with a few short fine setae on medial surface. Aedeagus with shaft short to long, cylindrical, directed dorsally, a pair of short to long ventrally directed subapical processes and sometimes an additional pair of very small or triangular subapical processes; basal apodeme elongate.

Female genitalia with first valvulae transversely striate dorsolaterally. Second valvulae moderately long and narrow, several prominent teeth distally, sometimes anterior teeth elevated; sclerotized region basad of teeth situated at dorsal margin; dorsal hyaline region present.

DISTRIBUTION. South Africa, South West Africa.

REMARKS. This genus can be distinguished by the following combination of characters: vertex with fine transverse striations, pronotum shagreened, and the male Xth segment fused to the pygophore anteriorly. *Rhusopus cuneiformis* and *R. aliwalensis* have been collected on species of *Rhus* in South Africa.

Key to the species of *Rhusopus*

1 Male 2
– Female 6
2 Aedeagal processes long (Fig. 137) 3
– Aedeagal processes short 4
3 Aedeagus with gonopore large, situated near base of shaft (Fig. 141) ..... ***hardua*** sp. n. (p. 252)
– Aedeagus with gonopore moderately large, situated at approximately midlength of shaft (Fig. 138) ..... ***gonubiensis*** sp. n. (p. 252)
4 Aedeagus with one pair of processes ..... ***cuneiformis*** (Naudé) (p. 251)
– Aedeagus with two pairs of processes, the more dorsal pair very small and narrow or triangular 5
5 Aedeagus with more dorsal pair of processes traingular ..... ***aliwalensis*** (Webb) (p. 251)
– Aedeagus with more dorsal pair of processes very small and narrow, not triangular ***turneri*** (Webb) (p. 252)
6 Second valvulae with sclerotized region at dorsal margin very long (Fig. 145) ***aliwalensis*** (Webb) (p. 251)
– Second valvulae not as above 7
7 Second valvulae with sclerotized region at dorsal margin very broad (Fig. 143) ***turneri*** (Webb) (p. 252)
– Second valvulae not as above 8
8 Second valvulae with more anterior teeth elevated (Fig. 144) 9
– Second valvulae not as above (Fig. 142) ..... ***hardua*** sp. n. (p. 252)
9 Second valvulae broad apically (Fig. 144) ..... ***cuneiformis*** Naudé (p. 251)
– Second valvulae moderately broad apically (Fig. 139) ..... ***gonubiensis*** sp. n. (p. 252)

Rhusopus cuneiformis (Naudé) **comb. n.**

(Fig. 144)

Idiocerus cuneiformis Naudé, 1926: 16. Holotype ♀, SOUTH AFRICA (PPRI) [examined].
Idioscopus cuneiformis (Naudé) Theron, 1976: 259, figs 84–95.

MATERIAL EXAMINED

Numerous examples from **South Africa**: Cape Town; Ceres (including holotype ♀); Fonteine; Katberg; Mossel Bay; Muldersvlei; Swellendam; Winburg (BMNH; PPRI).

REMARKS. This species has been recorded by Theron (1976) on *Rhus macowanii* from Ceres, on *R. laevigata* from Muldersvlei and on *Rhus* sp. from Tulbagh, Stellenbosch, Heidelberg (Tul) and Hammarsdale.

Rhusopus aliwalensis (Webb) **comb. n.**

(Fig. 145)

Idioscopus aliwalensis Webb, 1976: 314, figs 119–131. Holotype ♂, SOUTH AFRICA (BMNH) [examined].

MATERIAL EXAMINED

Numerous examples from **South Africa**: Aliwal North (type-series); Elandshoek; Fontein Dal Pta; H. Verwoerd Dam Site; Potchefstroom and Roodeplaat (BMNH; US; NCI; PPRI).

REMARKS. This species has been collected on *Rhus pyroides* and *Rhus* sp. at Potchefstroom.

Rhusopus turneri (Webb) comb. n.

(Fig. 143)

Idioscopus turneri Webb, 1976: 316, figs 132–135. Holotype ♂, SOUTH AFRICA (BMNH) [examined].

MATERIAL EXAMINED

South Africa: 1 ♂, 1 ♀ (type-series), Port St John (BMNH).

Rhusopus gonubiensis sp. n.

(Figs 136–139)

Length: ♂, 3·4–3·6 mm, mean 3·5 mm; ♀, 3·7–4·1 mm, mean 3·9 mm.

Colour as in generic description.

Male genitalia with aedeagal shaft relatively short and broad, a pair of moderately long processes subapically; gonopore moderately large, situated near midlength of shaft.

Female genitalia with second valvulae with sclerotized region at dorsal margin moderately long; teeth over distal one-third of valvulae, anterior teeth elevated.

MATERIAL EXAMINED

Holotype ♂, **South Africa**: East London, Gonubie, xii.1974 (*J. G. Theron*) (US).

Paratypes. **South Africa**: 21 ♂, 16 ♀, same data as holotype (US; BMNH); 2 ♂, Elandshoek, 27.xi.1968 (*A. L. Capener*); 1 ♂, 1 ♀, Port Elizabeth, 4.i.1975 (*J. G. Theron*) (all US); 1 ♂, Nelspruit, 10.ii.1966 (*P. Paliatseas*); 1 ♂, Pretoria, 31.i.1965 (*M. Hoffman*) (both NCP).

REMARKS. This species is closely related to *hardua* from which it differs in having the aedeagal processes shorter and the gonopore smaller and situated more dorsally. Both are generally smaller than other members of the genus and have long rather than short aedeagal processes. The second valvulae of *gonubiensis* resemble those of *cuneiformis* but are narrower apically. Several males examined have the genitalia poorly developed; the aedeagus is similar to that of *hardua* but the size and position of the gonoduct identify them as *gonubiensis*.

Rhusopus hardua sp. n.

(Figs 140–142)

Length: ♂, 3·7; ♀, 3·8–4·1 mm, mean 3·9 mm.

Colour as in generic description.

Male genitalia as in *gonubiensis* but aedeagus with processes longer and gonopore larger and situated near base of shaft.

Female genitalia with second valvulae similar to *gonubiensis* but more anterior teeth not elevated.

MATERIAL EXAMINED

Holotype ♂, **South West Africa**: Windhoek, D. Viljoen Park, 4–8.vii.1974 (*J. G. Theron*) (US).

Paratypes. **South West Africa**: 9 ♂, 9 ♀, same data as holotype (US; BMNH).

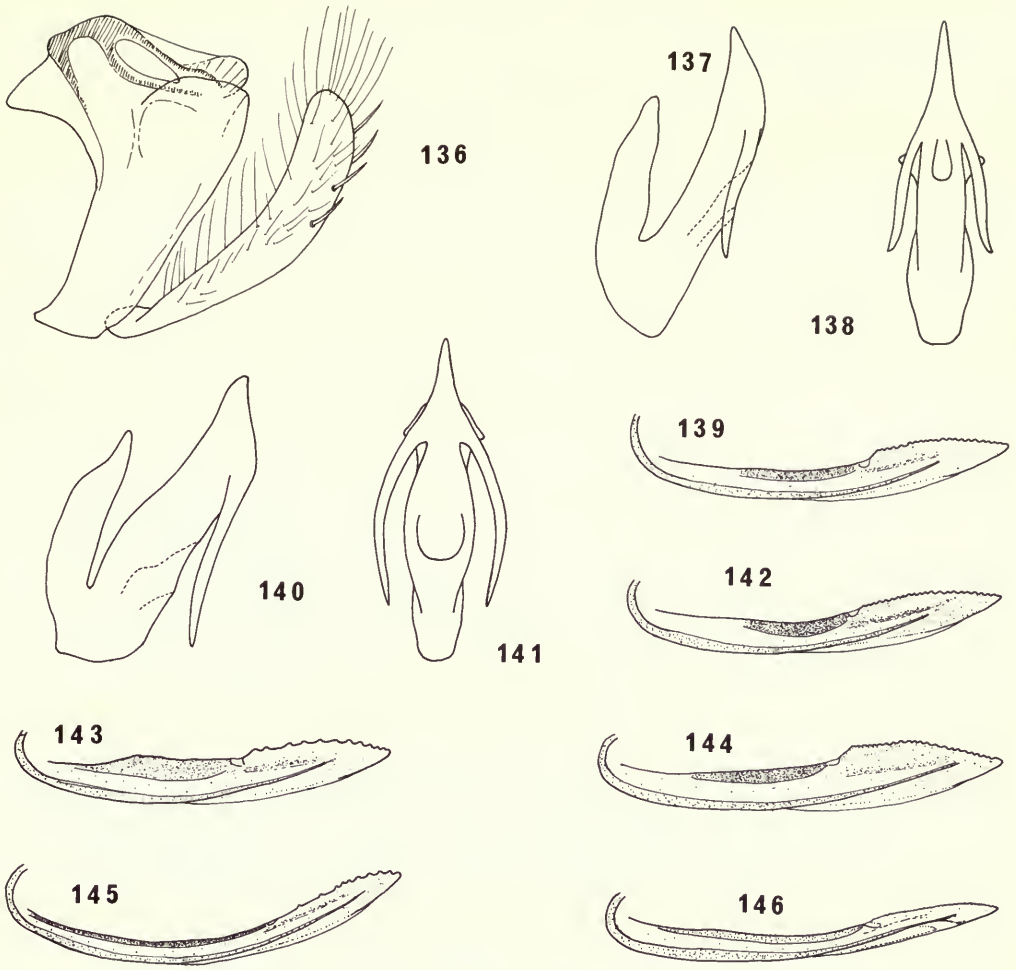
REMARKS. This species is closely related to *gonubiensis* but differs slightly in the shape of the aedeagus and second valvulae as noted above.

QUARTAUROPA gen. n.

Type-species: *Idioscopus nigrocellus* Webb.

Yellow to stramineous. Scutellum with a pair of dark brown basal triangles.

Head 1·12 times as wide as pronotum, shagreened. Vertex 4·27 times as wide as long; of uniform length. Face 1·15 times as wide as long; eyes small, inner margin of eyes 0·62 times perpendicular length of face below eyes; interocellar width twice ocellocular width; laterofrontal sutures indistinct; clypellus with sides



Figs 136–145 *Rhusopus* species. 136–139, *R. gonubiensis.* (136) male genital capsule; (137, 138) aedeagus; (139) second valvulae. 140–142, *R. hardua.* (140, 141) aedeagus; (142) second valvulae. 143, *R. turneri,* second valvulae. 144, *R. cuneiformis,* second valvulae. 145, *R. aliwalensis,* second valvulae.
Fig. 146 *Quartauropa nigrocellus,* second valvulae.

concave, apex wider than base; lora separated from facial margin throughout length; rostrum extended to near hind coxae. Pronotum shagreened. Scutellum slightly longer than pronotum, rugose with brown basal triangles shagreened. Forewings with first and second subapical cells closed, third absent. Hind femur with apical setal formula 2+1. Hind tibia flattened, with 13 spines in row 1, seven to eight spines in row 2 and seven spines in row 3; distal spines of row 2 with a weak basal process.

Male abdomen with basal apodemes reduced dorsally, lobe-like ventrally.

Male genitalia with Xth segment with anterior transverse region absent, lateral arms narrow, solidly attached to pygophore anteriorly. Subgenital plates very long and narrow, several long fine marginal setae apically and ventrally. Connective Y-shaped, with a dorsomedial keel. Style with apical process elongate, apex upturned foot-like; preapical lobe lateral. Aedeagus with shaft relatively short, curved dorsally, tapered to apex, laterally compressed, gonopore subapical on posterior surface; basal apodeme short.

Female genitalia with first valvulae transversely striate dorsolaterally. Second valvulae elongate, numerous very fine teeth extended over distal one-third of valvulae; sclerotized region basad of teeth situated at dorsal margin; dorsal hyaline region present.

DISTRIBUTION. Angola.

Remarks. This genus can be distinguished by the following combination of characters: eyes small; laterofrontal sutures indistinct; first subapical cell of the forewing closed; scutellum finely rugose and subgenital plates without dorsal marginal setae except at extreme apex.

Quartauropa nigrocella (Webb) comb. n.

(Fig. 146)

Idioscopus nigrocellus Webb, 1976: 330, figs 222–234. Holotype ♂, Angola (BMNH) [examined].

Material examined

Angola: 3 ♂, 2 ♀ (type-series), Tumdaula (BMNH).

REMOYA gen. n.

Type-species: *Idioscopus aldabraensis* Webb.

Yellow; scutellum with a pair of brown basal triangles.

Head 1·14 times as wide as pronotum. Vertex 4·5 times as wide as medial length; medial length equal to or longer than length next to eyes; finely and transversely striate. Face approximately equal in width to length, shagreened; eyes large, inner margin of eyes 1·10 times perpendicular length of face below eyes; interocellar width 3·5 times ocellocular width; laterofrontal sutures extended approximately one-third length to corresponding ocellus, more or less straight; lora separated from facial margin throughout length; clypellus with sides concave, apex wider than base; rostrum extended to hind coxae. Pronotum shagreened. Scutellum slightly shorter than combined length of pronotum and vertex, shagreened. Fore wings with first and second subapical cell open, third subapical cell absent. Hind femur with apical setal formula 2+1; hind tibia flattened, with 13–16 spines in row 1, six to seven spines in row 2 and four spines in row 3, distal spines of row 2 without a basal process.

Male dorsal and ventral basal abdominal apodemes lobe-like.

Male genitalia with Xth segment solidly attached to pygophore, lateral arms narrow, not extended ventrally. Subgenital plates elongate, of similar width throughout length; few moderately long fine marginal setae dorsally and few long stouter marginal setae apically and ventrally. Connective Y-shaped with dorsomedial keel. Styles with apical process elongate, apex upturned foot-like; preapical lobe lateral, several short fine setae laterally. Aedeagus relatively small, shaft elongate, cylindrical, curved dorsally and tapered to apex, pair of basal dorsally directed processes arising from anterior margin; basal apodeme elongate.

Female genitalia with first valvulae transversely striate dorsolaterally. Second valvulae moderately long and narrow, several prominent teeth over distal half of valvulae; sclerotized region basad of processes situated at dorsal margin, short; dorsal hyaline region absent.

Distribution. Aldabra.

Remarks. This genus can be distinguished by the following combination of characters: vertex finely and transversely striate, face long, second subapical cell of the forewing open, setosity of the subgenital plates as noted above and the aedeagus with a pair of basal processes.

Remoya aldabraensis (Webb) comb. n.

Idioscopus aldabraensis Webb, 1976: 318, figs 136–148. Holotype ♂, Aldabra (BMNH) [examined].

Material examined

Aldabra. South Island: 44 ♂, 29 ♀, Anse Cedre; 1 ♂, 1 ♀, Frigate Pool; 21 ♂, 16 ♀, Takamaka Grove; 4 ♀, Takamaka Pool; 2 ♂, 3 ♀, Takamaka (all type-series) (BMNH; USNM; PPRI; NM).

Nomen dubium

Idiocerus funereus Melichar

Idiocerus funereus Melichar, 1911: 111; 1922: 303, figs 1, 2. Type [sex unknown], 'British East Africa' (lost).

Remarks. The type of this species could not be found in any of Melichar's collections and is presumed lost. Although a colour description and figures are given by Melichar, I have been

unable to match a specimen to them. Important features are the absence of a brown spot near to each eye on the vertex and the pale transverse band on the face. The generic and specific identity of this species remains uncertain.

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J. N. Eliot and A. Kawazoé

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